New research on the history and technology of materials in paintings and other cultural heritage artefacts using advanced mass spectrometry techniques

AHRC-funded Collaborative Doctoral PhD Studentship with the University of Bristol and the National Gallery

The scholarly study of paintings and other artworks involves research into an artist’s creative processes, the nature of the materials and techniques used and the current condition of objects resulting from natural deterioration. Such studies benefit enormously from chemical analysis, wherein small samples of paint are physically removed from artefacts in order that the chemistry can be assessed in relation to the aforementioned factors. The organic components are of particular interest and can include a wide range of natural products, such as: oils, waxes, resins and proteins, all of which have the potential to profoundly influence the appearance of a work, its current condition and the planning of conservation treatments. These organic materials can be original components, such as paint constituents (binder, colorant or other additives) or later additions (e.g. repairs or retouchings, varnishes or other surface coatings). The paint samples taken from valuable works of art are typically very small and limited in number, so it is essential to extract as much information as possible. The chemical analysis of organic components is challenging for a number of reasons: (i) The complexity of the materials themselves, which often necessitates the detection of characteristic 'marker components' to identify the material (or obtain precise source or species information or the exact methods of production); (ii) The organic material(s) of interest will generally be quite minor components of the overall paint sample, and (iii) The heterogeneous nature of the samples and age of the artefact, which can often lead to the alteration of the organic materials via complex degradation processes. Hence, to obtain the maximum amount of chemical information from the minimum amount of paint it is important to use highly sensitive & specific analytical techniques.

The advertised studentship offers the successful candidate the opportunity to help answer both art historical and conservation-related questions using state-of-the-art mass spectrometry (MS) approaches. High resolution mass spectrometry using either Orbitrap MS or Q-TOFMS instruments offers substantial advantages over the current instrumentation typically used by heritage scientists. The studentship brings together researchers from the University of Bristol and the National Gallery and will use these new technologies to explore question relating to: (i) The detection of specific organic materials; (ii) The identification of the biological (or geological) source of organic materials; (iii) The status of organic materials (whether original additives to the paint or contaminants from a later conservation intervention). Achieving this will involve refining analytical protocols based on advanced instrumentation using reference samples selected from the extensive collection of natural products held within the National Gallery scientific department. The analytical protocols developed will then be applied to real problems within the cultural heritage
sector using authentic case studies, selected from on-going projects in the art-historical study or conservation of paintings from the National Gallery collection.

As with all postgraduate students enrolled at the University of Bristol the student will be supported by the Bristol Doctoral College. The College supports students in a wide variety of ways at all stages of their professional and personal development during their studies.

The successful student will receive a stipend of £15,009 p.a. plus £550 additional payment for Collaborative Doctoral Students. Tuition fees are also covered by the award. The student will receive additional support towards further research expenses from The National Gallery over the course of the research studentship.

Candidates should possess a degree in a relevant subject area, such as a 2:1 or higher in chemistry, or a related discipline aligned to the studentship. Students must also meet the eligibility requirements of the UK Research Council for graduate students.

Potential applicants should apply through the University of Bristol’s online postgraduate study application portal: [http://www.bristol.ac.uk/study/postgraduate/apply/](http://www.bristol.ac.uk/study/postgraduate/apply/)

Informal enquiries should be directed to:

Professor Richard Evershed: Email: r.p.evershed@bristol.ac.uk; Telephone: 0117 9287671 or Dr David Peggie: Email: david.peggie@ng-london.org.uk; Telephone: Tel: 020 7747 2825

**Closing date: 10th May 2019.**