

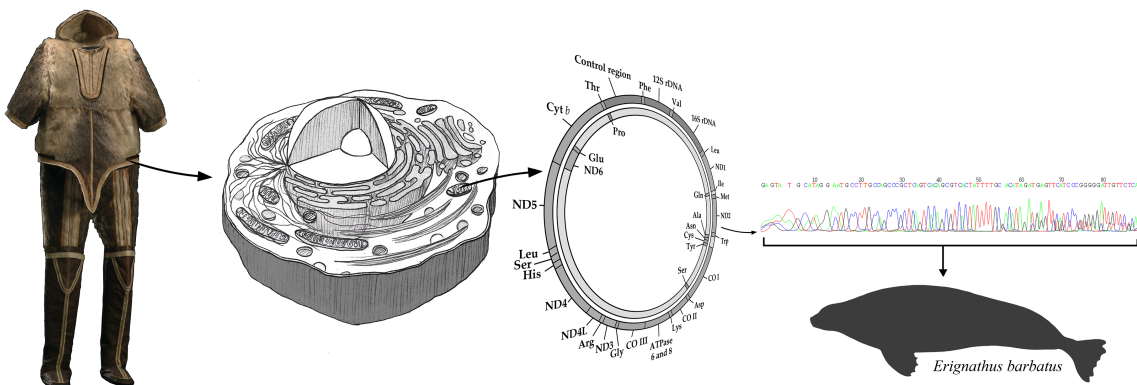
# A T O M S

**Analytical Tools for Organic Material Studies (ATOMS)**  
An introduction to new investigative science for the humanities

## FREE WEEKLY LECTURE SERIES

**Mondays 7 Dec 2015 to 29 Feb 2016**

Presented by the Centre for Textile Research  
1.30pm to 4.30pm



## Introduction

There is now a wide variety of innovative scientific tools available for the study of ancient and historical organic materials. These draw on pioneering work in medicine and industry to reveal new findings from archaeological evidence such as garments and footwear. Raw materials including wool, hair, flax, leather, bone, teeth and feathers are revealing revolutionary insights for scholars working in the humanities. These also offer new challenges for those developing scientific methods with forensic applications in non-traditional arenas.

This lecture series introduces these scientific techniques and explores how they are applied to textiles and other organic materials in the fields of archaeology, history, ethnology, anthropology and beyond. It looks at how the technologies have evolved from their initial applications to offer new perspectives in the humanities. The lectures will also be relevant to those working in the natural sciences who are interested in the opportunities for developing further forensic perspectives on material culture.

## Course content

Participants will become familiar with cutting-edge techniques from the natural sciences and how they may be applied in the humanities. They will learn relevant terminology, discover the processes involved, and discuss the range of potential results. Leading experts in pioneering fields will offer inspirational insights into DNA analysis, scanning electron microscopy, proteomics, micro-CT scanning, polynomial texture mapping, fluorescence imaging, dye identification, radio carbon dating, degradation analysis and identification of conservation interventions (see dates and topics below). Key issues such as sample sizes, removal and storage of suitable material, and prices for processing are also covered. There will be discussion of ethical questions and the political implications of discoveries.

The lecture series offers a unique opportunity for participants to gain an insight into the science behind the investigative techniques, how it can help develop new understanding in the humanities, and the range of applications to a variety of materials.

## Lecture programme

Mon 7 Dec 2015	<b>Genetics of the past:</b> Possibilities and limitations: an introduction to the lecture series and DNA analysis	Luise Ørsted Brandt, PhD, Research assistant, Centre for Textile Research
Mon 14 Dec 2015	<b>Identifying ancient fibres:</b> Light microscopy of hair. Sampling, mounting and reference material	Anne Lisbeth Schmidt, Conservator, The National Museum of Denmark (13.30-14.30)
	<b>Field trip:</b> Core Facility for Integrated Microscopy	Klavs Qvortrup, Professor, Core Facility for Integrated Microscopy (15.30-16.30)
Mon 4 Jan 2016	<b>Pinpointing provenance:</b> Strontium isotope analysis	Luise Ørsted Brandt, PhD, Research assistant, Centre for Textile Research
Mon 11 Jan 2016	<b>Field trip:</b> DNA laboratory and Archaeoscience, Center for GeoGenetics and the Natural History Museum of Denmark	Andaine Orlando, PhD fellow, The National DNA High-throughput Sequencing Centre and Pernille Bangsgaard, Assistant professor, The Natural History Museum of Denmark
Mon 18 Jan 2016	<b>Proteomics:</b> Ancient proteins - the new black of biomolecular archaeology	Luise Ørsted Brandt, Research assistant, Centre for Textile Research, and Enrico Cappellini, Assistant professor, Centre for GeoGenetics
Mon 25 Jan 2016	<b>Mapping the contours:</b> Micro-CT scanning and polynomial texture mapping <b>Field trip:</b> Danish Technical University (DTU)	Carsten Gundlach, Senior Research Engineer, Danish Technical University
Mon 1 Feb 2016	<b>Fluorescence imaging:</b> Advanced techniques in fluorescence microscopy	Nynne Christensen, Research assistant, Center for Advanced Bioimaging
Mon 8 Feb 2016	<b>Colour:</b> Dyes and pigmentation	Penelope Walton Rogers, Manager of the Anglo-Saxon Laboratory, York, UK (via Skype)
Mon 15 Feb 2016	<b>Dating the past:</b> An overview of C-techniques	Jan Heinemeier, Associate professor, AMS Centre Aarhus University
Mon 22 Feb 2016	<b>Excavation and re-excavation:</b> degradation analysis and identification of conservation interventions <b>Field trip:</b> The National Museum of Denmark, Brede.	Several lecturers, The National Museum of Denmark
Mon 29 Feb 2016	<b>The Two Cultures and a World Apart: Science and the humanities at a new crossroad:</b> Theoretical perspectives on the challenges presented by technological investigation. Following discussion.	Tim Flohr Sørensen, Assistant professor, University of Copenhagen. After the lecture, there will be a discussion with questions posed by Tim Flohr Sørensen, Ulla Mannering (Senior Researcher, The National Museum of Denmark) and Jane Malcolm-Davies, (Marie Skłodowska Curie Fellow, CTR)

Programme details as of 18 November 2015 (maybe subject to change)

Case studies will cover material evidence from a wide variety of eras and provide examples of the new insights provided by technological investigation. Examples include: using strontium isotope analysis to trace the provenance of an historical item; and undertaking degradation analysis to identify the effects of environmental conditions and historical conservation techniques on an archaeological artefact.

A recent innovative study of an iconic national treasure will show how protein collagen is more resistant to degradation than DNA and may offer the opportunity to extract molecular data which is more than a million years old. There will be discussion of how the “Danish” national ancestor, the Egtved girl, may have her roots in “Germany”, and how terminological challenges, concepts of nationality and political pressures have a bearing on how scientific findings are interpreted and communicated.

The concept of sustainable archaeology and the new horizons it opens up will be explored. New imaging techniques offer non-destructive perspectives on the inside and outside of ancient artefacts revealing sometimes unexpected and uncomfortable data, which may confound conventional assumptions about the ancient world.

Each lecture will be accompanied by recommended reading material and there will be opportunities for in-depth discussion of the implications of the new findings provided by all the innovative scientific investigative techniques.

## Learning outcomes

On completion of the lecture series, students will be able to:

- Identify scientific methods appropriate for investigating material culture;
- Describe specific scientific investigative methods currently applied in the humanities;
- Compare and contrast examples of findings from specific methods applied to material culture in the humanities;
- Discuss ethical issues relevant to investigative science in the humanities;
- Present arguments for and against specific methods for a variety of material;
- Evaluate the potential and the limitations of new investigative science in the humanities; and
- Critically assess the appropriateness and ethical implications of specific scientific investigation techniques for a variety of contemporary, historical and/or archaeological material.

## Prerequisite study

No previous study is required although participants should have an active interest in the humanities and how material culture offers evidence for new interpretations of society in the past.

The lecture series is suitable for undergraduates, masters, PhD students, postdoctoral researchers, and others seeking a critical understanding of innovative scientific techniques. It aims at encouraging interdisciplinary discussion among staff and students in archaeology, prehistory, art history, history, cultural studies, ethnology, ethnography, anthropology, communication studies and the natural sciences.

Participants who are not staff or students at the university are also welcome.

The lectures will be delivered in English.

A certificate of attendance will be issued on request.

## Bookings

Each lecture is open to all at no charge. Participants may book for any number of lectures or the whole series. Those booking for the series will have priority for the sessions including places for the field trips.

There is a maximum of 70 places for each lecture to be held at room 15.A.0.13 at the University of Copenhagen, Karen Blixens Vej 4, 2300 Copenhagen S (see map below) from 1.30 to 4.30pm. Please note that field trips are restricted to a smaller number and are offered in strict priority booking order.

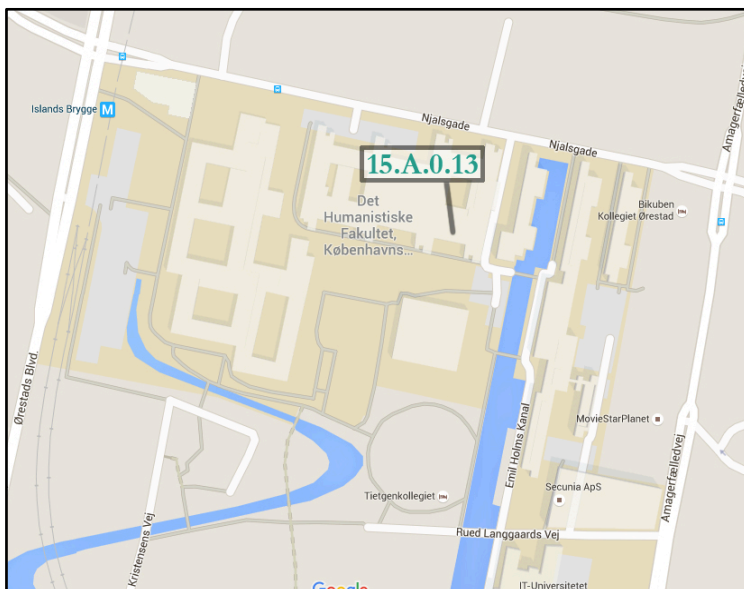
Enquiries to: [jmalcolm-davies@hum.ku.dk](mailto:jmalcolm-davies@hum.ku.dk)

**Lecture series leader:** Dr Luise Ørsted Brandt, CTR and The National Museum of Denmark

**Lecture series developer:** Dr Jane Malcolm-Davies - Marie Skłodowska Curie Fellow, CTR

## Centre for Textile Research

University of Copenhagen, Amager Fælled Vej 56, 2300 Copenhagen S



## Preliminary bibliography

Andersson Strand, E. B.; Frei, K. M.; Gleba, M.; Mannering, U.; Nosch, M.-L. and Skals, I. 2010: Old Textiles - New Possibilities. *European Journal of Archaeology* 13, 149-173.

Brandt, L. Ø.; Tranekjer, L.; Mannering, U.; Ringgaard, M. G.; Frei, K. M.; Gleba, M. and Gilbert, M. T. P. 2011: Characterising the potential of sheep wool for ancient DNA analyses. *Archaeological and Anthropological Sciences*. 3, 209-221.

Brandt, L. Ø.; Schmidt, A. L.; Mannering, U.; Kelstrup, C. D.; Olsen, J. V.; Sarret, M. and Cappellini, E. 2014: Species identification of archaeological skin objects from Danish bogs: comparison between mass spectrometry-based peptide sequencing and microscopy-based methods. *PLoS ONE* 9 (9): e106875.

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Gleba, M. 2012: From textiles to sheep: investigating wool fibre development in pre-Roman Italy using scanning electron microscopy (SEM). *Journal of Archaeological Science*. 39, 3643-61.

Mannering, U.; Possnert, G.; Heinemeier, J. and Gleba, M. 2010: Dating Danish textiles and skins from bogs by means of  $^{14}\text{C}$  AMS. *Journal of Archaeological Science*. 37, 261-268.

Vanden Berghe, I.; Gleba, M. and Mannering, U. 2009: Towards the identification of dyestuffs in Early Iron Age Scandinavian peat bog textiles. *Journal of Archaeological Science*. 36, 1910-1921.