

Centre for Archaeological Science

CAS Laboratories

[Optically Stimulated Luminescence \(OSL\) Dating Laboratory](#)

[Amino Acid Racemisation \(AAR\) Laboratory](#)

[Radiocarbon Dating Sample Preparation Laboratory](#)

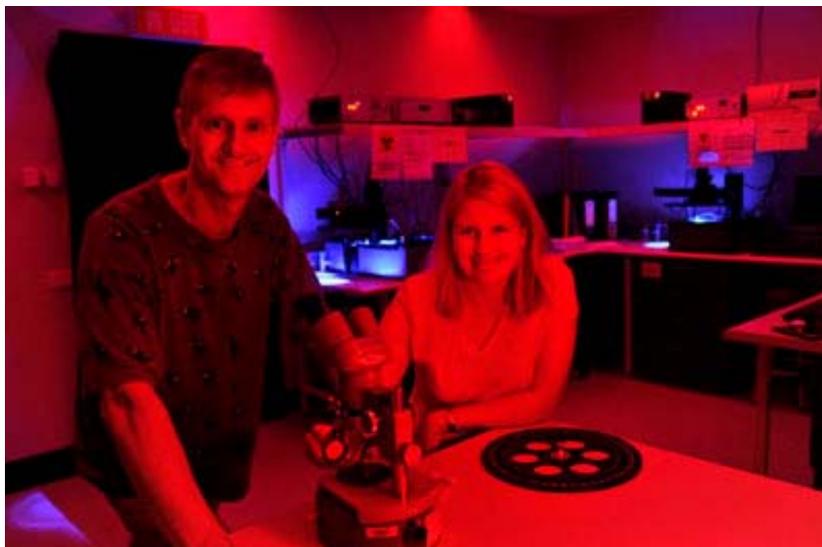
[Microscope Laboratory](#)

[Zooarchaeology Laboratory](#)

Optically Stimulated Luminescence (OSL) Dating Laboratory

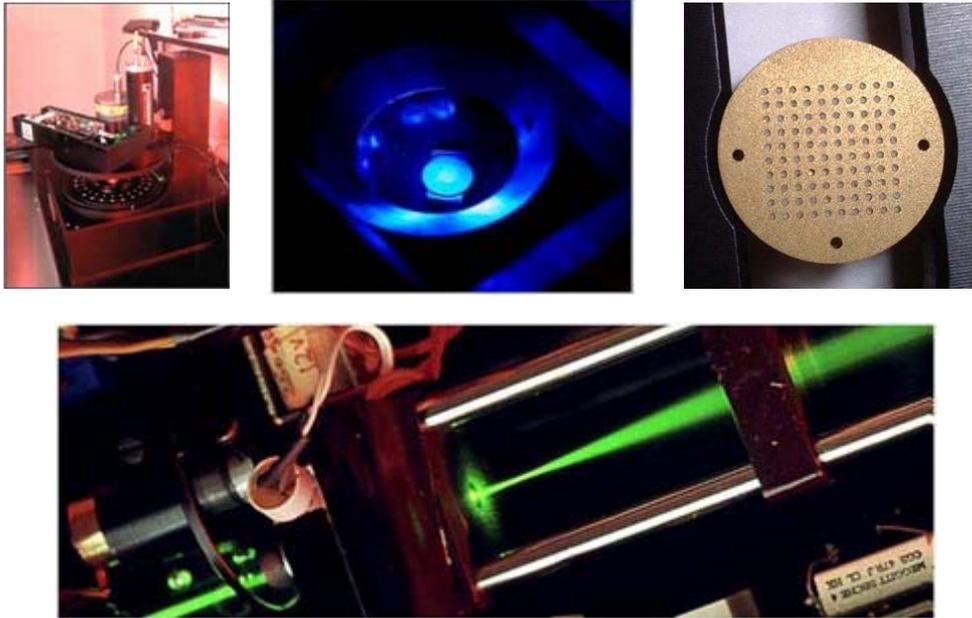
OSL dating can be used to determine the time since naturally occurring minerals, such as quartz and feldspar, were last exposed to light within the last few hundreds of thousands of years. It is one of the main methods used to establish the timing of key events in archaeology and human evolution, landscape and climate change, and palaeobiology in the latter half of the Quaternary. The age is obtained by measuring the radiation dose received by the sample since it was last bleached by sunlight, and dividing this estimate by the dose rate from environmental sources of ionising radiation.

The OSL dating laboratory is located in the School of Earth & Environmental Sciences and is headed by [Bert Roberts](#) and [Zenobia Jacobs](#).



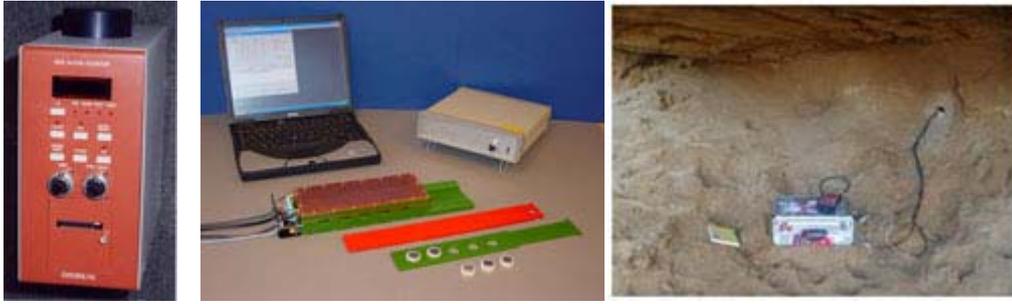
Bert and Zenobia in the red-light OSL instrument room at UOW and CAS, with some of the Risø TL/OSL readers in the background.

The OSL lab is recognised as one of the world's leading archaeological dating laboratories, based on its track record of using OSL dating to answer internationally significant questions in archaeology and palaeoanthropology. Past and present research interests span a wide geographic compass, including Africa, Asia, Australia, Europe and North America, and topics as diverse as the evolution and behaviour of humans (*Homo sapiens*, *Homo floresiensis* and *Homo neanderthalensis*), their response to climatic changes over the past 200,000 years, and their interaction with the indigenous fauna and flora. The OSL dating laboratory is also at the forefront of technical advances in the analysis and interpretation of OSL data collected from single sand-sized grains of quartz, building on the pioneering research of Roberts and Jacobs in this field.



Clockwise from top left: A Risø TL/OSL reader used for OSL measurements in the lab. Samples can either be measured as single aliquots, where each disc contains multiple grains that are stimulated with blue light (centre top) simultaneously, or grains can be measured individually. For the latter, grains are mounted on specially made gold-plated aluminium discs with 100 holes precision drilled into the surface of the disc (top right). These grains are then individually stimulated by green laser light (bottom photo) focussed on to a small part of the grain.

The state-of-the-art laboratory consists of separate rooms for the preparation and measurement of quartz and feldspar grains, as well as storage rooms for quarantined material. All rooms are fitted with safelights, similar to a photographic darkroom. A full range of modern facilities are available to extract and purify quartz and feldspar grains for dating. There are five Risø instruments to stimulate and detect the OSL emissions for purposes of dose determination, three of which have focussed laser attachments to permit measurements of individual grains of quartz and feldspar. The laboratory has two portable gamma-ray spectrometry units to measure the on-site dose rate from gamma radiation, and laboratory determinations of sample radioactivity can be made using a Risø GM-25-5 low-level beta-counting unit and three Daybreak 583 thick-source alpha counters.



Left to right: A Daybreak thick-source alpha counter, Risø GM-25-5 beta counter and (DigiDart gamma spectrometer) used in the laboratory and field for radioactivity measurements of the dated samples.

PhD students and postdoctoral research

PhD students and postdoctoral researchers are encouraged to become proficient in OSL sample preparation and measurement procedures, and in the analysis and interpretation of the resulting data. Some past members of the laboratory, such as Kira Westaway and Lee Arnold, now lead OSL dating laboratories elsewhere in Australia and overseas.

Amino Acid Racemisation (AAR) Laboratory

Amino acid racemisation dating of fossils, such as eggshell and mollusc shell, found at archaeological and geological sites is performed at the University of Wollongong in a new AAR laboratory housed in the School of Earth & Environmental Sciences. This laboratory is likewise equipped with state-of-the-art instruments to measure the chemical properties of minuscule samples, such as the individual foraminifera analysed by Colin Murray-Wallace and his team.

Radiocarbon Dating Sample Preparation Laboratory

Preparation of archaeological and environmental samples for radiocarbon (^{14}C) dating of specific organic compounds is able to be completed at the Radiocarbon Dating Sample Preparation Laboratory within the School of Earth & Environmental Sciences. In this laboratory, individual biomolecules can be identified, extracted and purified for dating, under the direction of Allan Chivas.

Microscope Laboratory

Specialist microscopes have been purchased by CAS and we are awaiting their arrival.

More will be added to this page then.

Zooarchaeology Laboratory

This laboratory is dedicated to the basic sorting and analysis of archaeological materials and faunal materials, as well as sample preparation. A range of basic weighing, measuring, sorting, and analytical equipment is available. Secure AQIS-approved space is provided for storage and analysis of archaeological materials under quarantine restrictions and there is storage for other materials. Low-power stereo-microscope facilities and a 3-D laser scanner are also available for the analysis of archaeological and faunal materials, and are situated in the clean, well-lit space of the AAR laboratory.