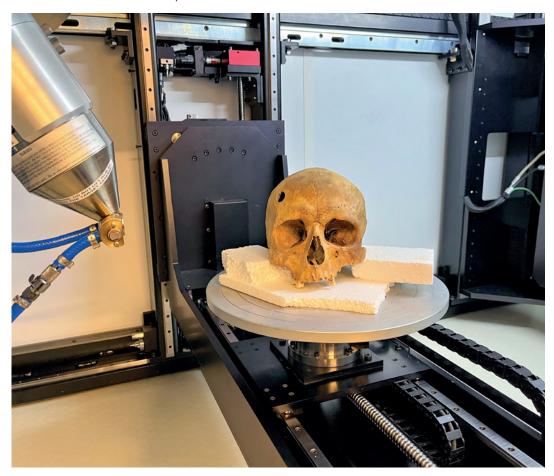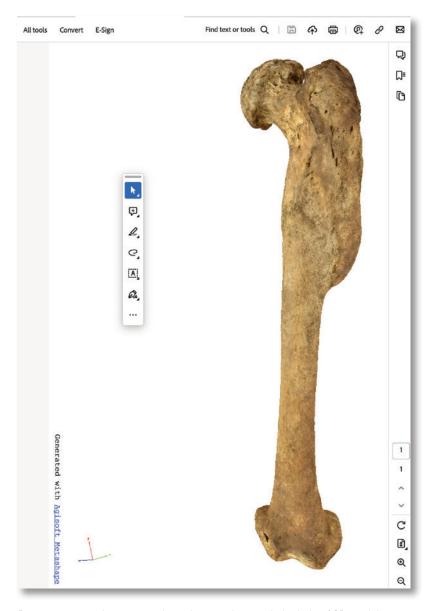# Bones & Bytes: Raising public awareness about musculoskeletal research with digitised archaeological bone specimens

**Flora Gröning, Senior Lecturer in Anatomy, University of Aberdeen, and
Bruce Mann MCIfA, Archaeologist, Aberdeenshire Council Archaeology Service**

During the Covid lockdowns, Aberdeenshire Council Archaeology Service gave support and advice to the Aberdeen Centre for Arthritis and Musculoskeletal Health and the University of Aberdeen on a project to raise public awareness about musculoskeletal research using digitised archaeological bone specimens. According to the World Health Organization, musculoskeletal conditions such as arthritis, low back pain and fractures are the leading contributor to disability worldwide. These conditions impair quality of life and are associated with significant socio-economic burden. The project aimed to raise public awareness about musculoskeletal conditions and promote the world-class research that is conducted at the Aberdeen Centre for Arthritis and Musculoskeletal Health (ACAMH) to improve diagnosis, prevention and treatment, in this case through the use of medieval and post-medieval human remains from Aberdeen.

Skull in microCT scanner (All photos: University of Aberdeen)

Patients can now learn more about their condition with the help of 3D models.

photo-realistic and high-resolution digital 3D models and 3D prints of these specimens.

Members of the public, in particular patients suffering from the modelled musculoskeletal diseases, can now learn about what is affecting them through the 3D models and associated information. ACAMH is using the data to improve diagnosis and the models are now part of the teaching course for students both of medicine and archaeology. The data is also being used to inform future research in this area.

The project illustrates how the results of archaeological excavation in advance of development work can continue to have significant social value, in this case contributing to medical research, many years after the original work was completed. The work has also contributed to research into female experiences of physical impairment and disability in medieval Scotland.

With credit to the collaborative work between the Aberdeen University Aberdeen Centre for Arthritis and Musculoskeletal Health and Archaeology Departments, Bruce Mann MCIfA, Regional Archaeologist for Aberdeenshire and the original excavators, Alison Cameron MCIfA (Cameron Archaeology), Judith Stones (Carmelite Friary and St Nicholas Kirk) and Derek Hall MCIfA (Whitefriars, Perth).

A multidisciplinary team of clinicians and researchers, including rheumatology, orthopaedics, discovery science, anatomy, epidemiology, primary care and health services research, alongside archaeologists and museum curators, identified examples of archaeological human bone specimens with clear signs of skeletal pathologies in the extensive specimen collection held by the university's museums. The specimens were all from skeletons recovered and analysed as part of developer-led excavations, some of which had been completed many years ago. These included excavations at the Carmelite Friary in Aberdeen in 1994 and at St Nicholas Kirk in Aberdeen in 2006, undertaken by Alison Cameron MCIfA of Cameron Archaeology and Judith Stones, and at Whitefriars in Perth between 2014 and 2017, undertaken by Derek Hall MCIfA. These were then subjected to 3D photogrammetry and micro-computed tomography (microCT) to create

KEY OUTCOMES/MESSAGES

- this case study illustrates the creation of new knowledge and understanding from archaeological research in advance of development. In this case, human remains excavated between 1994 and 2017 have contributed to multidisciplinary medical research long after the end of the excavations

- by raising awareness of arthritis and other musculoskeletal conditions, the work contributes to UN Sustainable Development Goals 3 and 4: Goal 3, 'Ensure healthy lives and promote well-being for all at all ages'; Goal 4, 'Quality Education'