X-ray imaging of a water bear offers a new look at tardigrade internal anatomy

Tardigrades (water bears) are microscopic invertebrates of which the anatomy has been well studied using traditional techniques, but a comprehensive three-dimensional reconstruction has never been performed. In order to close this gap, we employed X-ray computed tomography (CT), a technique that is becoming increasingly popular in zoology for producing high-resolution, three-dimensional (3D) scans of whole specimens. While CT has long been used to scan larger samples, its use in some microscopic animals can be problematic, as they are often too small for conventional CT yet too large for high-resolution, optics-based soft X-ray microscopy. This size gap continues to be narrowed with advancements in technology, with high-resolution imaging now being possible using both large synchrotron devices and, more recently, laboratory-based instruments.