Dr. Chong Chen's Background

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Dr. Chong Chen is a biologist primarily working on deep-sea invertebrates. Widely interested in marine organisms and their adaptations, he combines morphological (e.g., histology, dissection, microscopy) and molecular (e.g., phylogeny, population genetics, genomics) methodologies in attempt to understand their ways of life and how they evolved. His main study organisms are molluscs (snails, clams, octopuses, chitons, etc.), the largest marine phylum with over 100,000 living species and also megadiverse in terms of both morphology and adaptations. A key focus of his research is in the adaptation of molluscs to 'extreme' deep-sea ecosystems such as the hydrothermal vents, and he has dived to over 3,300 m deep in the manned submersible *Shinkai 6500* in person to explore these ecosystems. Furthermore, he is also a taxonomist primarily working on gastropod molluscs (snails and slugs). When not working he is also an avid collector of molluscan specimens ('shell collector') and photographer.

3D reconstruction with AMIRA: Serial sectioning, micro-CT, and beyond

Three-dimensional reconstructions is becoming an essential approach in modern biology for morphological studies. To optimize protocols for observation and 3D reconstruction, various mineralised and soft tissue of marine animals were subjected to serial sectioning and X-ray computed tomography (CT). Mineralised skeletons were easily visualized using micro-CT except for cases with extreme thickness heterogeneity. For anatomy, serial sectioning after resin embedding resulted in superb quality stack for anatomical reconstructions, but is very time-consuming to prepare. Soft-tissue scanning with micro-CT requires staining to enhance image contrast and even then, except very large specimens, noise and length of scanning was problematic with conventional micro-CT. Producing high-quality stacks of soft parts through CT required going one step beyond – utilising synchrotron radiation based micro-CT. Reconstruction of 3D data in the specialist software AMIRA facilitates not only in-depth observation of morphological traits but also their quantification, for example volume can be calculated even for very complex form. Furthermore, specimens may be replicated and enlarged with a 3D printer. All in all, 3D reconstruction with software such as AMIRA provides highly useful data for morphological studies of both mineralised parts and soft tissues.