TRACING EARTH'S HISTORY IN ROCKS AND FOSSILS

Geologists at Northwest University are exploring HOW MOUNTAINS AND VALLEYS FORMED, while uncovering buried resources.

Geology is about much more

than rocks. It is about the study of the structure, evolution and dynamics of the planet, as well as exploring the wealth of resources that lie within it.

The Department of Geology at Northwest University was established in 1939. Located in the foothills of the Qinling Mountains, its researchers study the formation and evolution of the continents, and the origins of life. The department also hosts China's State Key Laboratory of Continental Dynamics.

Here, researchers led by Guowei Zhang, are well positioned to study the Qinling Orogenic Belt and the northwest region in China. The belt is a vast geological feature, dividing northern and southern China, that has been shaped by a long history of tectonic activity. Northwest geologists' research on the formation and evolution of the belt provides a model for broader studies of continental landmasses¹. The team has discovered high-pressure and ultrahighpressure metamorphic rocks, and unearthed crucial clues to advance understanding of the ancient Tethys Ocean, the supercontinents of Gondwana² and Nuna (Columbia), as well as the geology of the Precambrian era.

Northwest paleontologists have discovered some of the oldest fossils on record. In 2017, researchers led by Degan Shu, in collaboration with researchers from the United Kingdom and Germany, described in *Nature*



▲ A specimen of Myllokunmingia, a 5.2-million-year-old fossil fish, discovered by NWU palaeontologists, and a representation of South China's early Cambrian marine life.

a sac-like sea deuterostome creature with a large mouth that could be a primitive ancestor of all vertebrates, including humans. More recently, another Northwest team, led by Xingliang Zhang, revealed in *Science* a significant collection of well preserved, diverse ancient marine fossils, known as the Qingjiang Biota³, dating back more than half a billion years ago to the Cambrian Period.

Earth scientists in the department also closely monitor global issues, such as energy security. Northwest University was the first Chinese university to undertake studies in petroleum geology. For many years, researchers at Northwest have focused on regions where continental mountains meet sedimentary basins, called basin-mountain systems. Their efforts to understand the formation and dynamics of these systems have resulted in new methods for surveying and exploiting deep, unconventional fossil fuel resources. These have helped in the discovery of several oil and gas fields in China. Geologists at the university are currently investigating geological conditions suitable for safe, longterm carbon storage.

Research from the department has also contributed to the construction of valuable infrastructure on highly fertile but unstable loess, a loose and porous soil that covers about 10% of the world's land surface. China's significant amount of loess is mainly found on the Loess Plateau that borders the Yellow River. Loess covered areas are prone to erosion and landslides, so researchers investigate the factors influencing its stability. Their geological models for predicting and sensing instability have enabled reinforcement techniques to safeguard the

construction of more than 20 railway lines in China and around the world.

Northwest University geologists and paleontologists are closely collaborating with their peers at universities in the United States, United Kingdom, Australia, and elsewhere. They intend to continue revealing important and impactful insights into Earth's history.

REFERENCES

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