

Formation history of the Japanese Islands illustrated by Itoigawa UNESCO Global Geopark

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1. Itoigawa Fossa Magna Museum

Itoigawa UNESCO Global Geopark has metamorphic, igneous and sedimentary rocks formed from Paleozoic to Cenozoic, which illustrate the formation environment and process of the lands of Itoigawa. Also, the rocks form characteristic geologic structures such as the Fossa Magna whose western edge is defined as the Itoigawa-Shizuoka Tectonic Line. We can understand an overview of the geologic history of the Japanese Islands from rocks and geologic structures observed in the Itoigawa Geopark. Plenty of rock pebbles which are polished and palm-sized have been carried by debris flows from mountainous areas to the sea. The coast of Itoigawa is like a 'museum of stones'. Thus, Itoigawa Geopark can illustrate the formation processes of the Japanese Islands including its continental era over 500 million years, which are representative of island arcs situated on the western margin of the Pacific Ocean. The formation history of the Japanese Islands is exhibited in the Fossa Magna Museum as the information base of the Itoigawa Geopark and the exhibition helps visitors to understand the relationship between geosites observed in the field and the history of the Japanese Islands.

The history of the Japanese Islands illustrated by geology of the Itoigawa Geopark is as follows:

Jade rock (Paleozoic era): Jade rocks including gem quality jade had formed in the deep part of the continental margin where the oceanic plate was subducting. After that, jade had been uplifted by tectonic serpentinite diapir with other metamorphic rocks including new minerals or rare minerals from the deep part to the shallow part of the crust. Jade rocks and metamorphic rocks exposed in the mountainous area were carried as rock pebbles to the sea by debris flow generated in the uplifting mountainous area in the Quaternary. People in the Jomon era, (Neolithic age, 6000 years ago) collected jade pebbles from the beach and made jade beads which shows the world's oldest jade culture. Jade was the first stone that spread over the Japanese Islands as a stone showing the spiritual nature of the Jomon people.

Limestone (Paleozoic era): Coral reefs which formed on top of or around a volcanic island in the Paleo-Pacific Ocean had changed to thick limestones during movement processes of the oceanic plate. In the Quaternary period, uplifting of the land made characteristic karst landforms such as many dolines with deep caves in the limestone. Inside of the dolines thick snow even in the summer has kept the environment of the Ice age.

Kuruma Group (Mesozoic era): Jurassic Kuruma Group consisting mainly of sandstone and mudstone includes plenty of fossils of fauna and flora. Especially fossil of flora changed to coal beds which were mined intermittently in the Meiji to Showa periods.

Fossa Magna and Itoigawa-Shizuoka Tectonic Line (Cenozoic): The Fossa Magna which shows a North-directed geological depression in central Japan was a great fissure formed during the opening process of the Sea of Japan. The Fossa Magna is filled with sandstone, mudstone and volcanic rocks which were deposited on the sea floor. These strata including marine mammal fossils exposed in the mountainous area shows evidence that mountains of the Fossa Magna region originated from the old sea floor. Shear zone of the Itoigawa-Shizuoka Tectonic line forms a large valley between the Kubiki Mountains (Fossa Magna) and the Hida Mountains (rocks of Mesozoic to Paleozoic). The Salt Road which

was made along the tectonic line was a trail for trade between Itoigawa and mountainous provinces. Salt and marine products were carried to mountainous areas from Itoigawa, while tobacco and cereals were carried to Itoigawa from mountainous areas.

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