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Radiolarian Cherts and Associated Rocks in Space and Time

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with 6 figures in the text and 1 plate (I)

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ABSTRACT

Radiolarian cherts and associated rocks occur throughout the geological column from Cambrian to Eocene-Lower Oligocene. Major periods of chert deposition were the Ordovician, Silurian, Devonian, Upper Jurassic and Upper Cretaceous.

Radiolarian cherts and associated sediments such as pelagic limestones, siliceous shales, graded lime-grainstones, sandstones, greywackes and coarse clastics, which occasionally show graded bedding, were deposited in the eugeosynclinal part of major geosynclines. In accordance with KÜNDIG's views, the eugeosynclinal sedimentary fill can be subdivided into perennial cherts, pelagic limestones, siliceous shales, and catastrophic olistostrome-turbidite rocks.

In the Tethys geosyncline, two main periods of chert deposition are known: Upper Jurassic in the Mediterranean area, and Upper Cretaceous in the Near, Middle and Far East. Cherts were also formed during the Palaeozoic in the Caledonian trough, the Ural geosyncline, the Tasman geosyncline, and a few minor basins, and during late Palaeozoic, Mesozoic and mainly late Mesozoic in the Circumpacific belt.

Ophiolites, intermediate igneous rocks, tuffs and tuffaceous breccias are usually found together with radiolarian cherts and related sediments. In a few cases it can be proved that the emplacement of ophiolites is more or less syntenporaneous with chert deposition, and that a petrogenetical connection must exist. In other cases, however, a direct ophiolite-chert relationship is not obvious. Cherts not associated with ophiolites are rather the exception to a general rule.

The present world-wide review corroborates STEINMANN's original concept that cherts were deposited in deep-sea basins, characterized by strong tectonic mobility, which facilitated intrusion and extrusion of basic and ultra-basic magma. Excess silica and hematite supply and carbon dioxide exhalations in connection with ophiolitic magmatism are an additional characteristic of syntenporaneous ophiolite-chert assemblages.

The main periods of chert genesis, i.e. Ordovician, Silurian and Devonian, Upper Jurassic and Upper Cretaceous, were characterized by a tropical to sub-tropical, moist climate. The theory is advanced that there is probably a close relationship between tropical palaeoclimate, abundant growth of radiolarians in surface water and the predominant red colour of cherts.

Chert-ophiolite belts have a structural style of their own, which is mainly due to vertical tectonics and gravity sliding during the basinal and the orogenic phase.

A new nomenclatural system is proposed to designate ophiolite-chert associations.

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