Conclusions

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F. POST-OROGENIC TECTONIC POSITION AND STRUCTURAL STYLE

Radiolarian cherts and associated rocks usually occur in the internal zones of mountain systems. They are often part of structurally complex units, characterised by faulting, thrusting, gravity-sliding and large-scale overthrusting. Epi-metamorphism is also observed.

Vertical tectonics and gravity-sliding play a major role not only during the eugeosynclinal stage of a basin but also characterise the orogenic history. Major basinal downwarps in tectonically active zones are followed by major uplifts, and the extreme difference in relief is compensated by tectonics.

The chaotic puzzle presented by an ophio-olisto-silite is difficult to untangle, as basinal and orogenic history are closely interwoven. The incompetent structural style of a chert sequence can be interpreted as resulting from slumping in the basin, disharmonic folding due to compression or post-upheaval gravity-sliding. In most cases no really convincing argument can be produced in favour of any particular one of these interpretations.

Radiolarian chert-ophiolite belts have a structural style of their own representing a complex, comparatively short-lived eugeosynclinal phase of a long miogeosynclinal basin history. Where chert-ophiolites are exposed, the impression of major diastrophic events is created. It should not be overlooked that the structural style of older and younger sediments in the vicinity of ophio-silites is usually completely different. In some areas a simple anticlinal belt can hide a complex ophiolite-chert body, which itself can be underlain by large, competent folds. Ophiolite-chert associations can be considered therefore as crustal layers distinguished by a difference in their behaviour as a result of basinal and orogenic deformation as compared to the overlying and underlying strata of different lithologic composition.

4. Conclusions

From a world-wide literature review of radiolarian cherts and associated rocks and the author's personal experience, the following conclusions may be drawn:

1. The impression is gained that radiolarian cherts and associated rocks, in comparison with continental and shallow marine sediments, have been inadequately investigated and are not fully understood. Many uncertainties regarding their petrographic characteristics, geological age, field relationship and genesis still exist, so that an attempt at even a partial synthesis of the chert problem seems premature. In this context the following remarks have to be considered.

2. 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 and siliceous shales, and catastrophic olistostrome-turbidite rocks. Sedimentological and faunistic evidence points to deposition in rather deep water, thus confirming concepts held by Molengraaff (1900), the Steinmann school, and more recently by Colom (1955), Kündig (1959), Trümpy (1960) and others.

3. Ophiolites are found together with radiolarian cherts on a world-wide scale (see Table 1). Chert occurrences not associated with ophiolites are rather the exception to a general rule. In many cases it can be shown that ophiolites and cherts are syntemporaneous. A direct relationship between ophiolite thickness and chert thickness can often be observed and seems to confirm the long held view that silica was supplied in connection with the intrusion and extrusion of ultra-basic and basic magma. Other ophiolite-chert relationships are less obvious. KÜNDIG's view that ophiolites usually occur along hinge zones can be corroborated.

4. Radiolarian chert-ophiolite associations are known throughout the geological column from Cambrian up to Eocene-Lower Oligocene. Chert deposition is especially characteristic of the Upper Jurassic and Upper Cretaceous, and to a minor extent of the Ordovician, Silurian and Devonian. The predominantly red colour of Upper Jurassic and Upper Cretaceous cherts can be ascribed to hematite, which originated in red upland soils under a moist tropical and subtropical climate, and was subsequently washed into the geosynclinal basin. As the main periods of chert genesis, i.e. Ordovician, Silurian and Devonian, Upper Jurassic and Upper Cretaceous, were characterised by a tropical to subtropical, moist climate, the theory is advanced that there is probably a close relationship between tropical palaeoclimate, abundant growth of radiolarians in surface water and red colour of cherts.

5. Radiolarian cherts occur mainly in the eugeosynclinal parts of the Tethys geosyncline, which extends from south-western Europe to the Malayan archipelago. In the Mediterranean part of the Tethys, the radiolarian cherts are Upper Jurassic; in the Middle-East–Far-East part they are predominantly Upper Cretaceous. Mesozoic radiolarian cherts are also found in the Circumpacific Belt (California, Latin America, Japan, Philippines and New Zealand).

Palaeozoic radiolarian cherts occur in the Caledonian trough, the Ural geosyncline, the Tasman geosyncline, and sporadically in a few other Palaeozoic basins.

6. Radiolarian chert-ophiolite belts have a structural style of their own, which is due to differences in their behaviour as a result of basinal and orogenic deformation as compared to overlying and underlying layers of different lithologic composition. Vertical tectonics and gravity-sliding play a major role not only during the eugeosynclinal stage of a basin but also characterise the orogenic history.

7. Radiolarian cherts and associated rocks belong to a sedimentary-magmatic unit which is characteristic for the slope-eugeosynclinal phase of a major geosynclinal basin.

5. REFERENCES

(Mention is also made of a few articles not discussed in the text)

(a) REGIONAL

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