

Biochronology and systematics of early Cretaceous radiolaria of the Western Tethys

Jud R.

About 500 samples of Uppermost Jurassic to Lowermost Aptian cherty limestones, most of them in the Maiolica facies, were studied for their contents in radiolarians in order to make a comprehensive inventory of radiolarian assemblages and to establish a radiolarian biochronology calibrated and correlated to the magnetostratigraphy established in the same sections and to biozonations of other fossil groups. The samples were collected from 26 land sections in Switzerland, Italy and Oman. Of several hundred morphotypes recorded in 245 well preserved samples from only 13 sections of the 26 examined, 175 radiolarian taxa were selected, and species occurrences were calculated with the computer program "BioGraph" (Savary & Guex, 1990). This resulted in 35 successive Unitary Associations (U.A.) that could be grouped into 11 biozones whose terminology follows and continues that of Baumgartner (1984b). A protoreferential or "range chart" based on U.A. was finally synthesised for all species selected between the interval of the Middle Tithonian and the Lowermost Aptian.

The 11 radiolarian zones (C1-G2) were correlated to magnetic polarity chrons, calpionellid zones and nannofossil events established by previous workers on the investigated sections. Diachrony in correlating the radiolarian zones is probably caused by several reasons among which lithostratigraphy, species definition and abundance, calibration with magnetic chrons and definition of these chrons are among the most important.

Although the studied sections belong to several distinct paleogeographic areas with basinal and seamount facies: Prealpine Nappes (Northern Tethys), Southern Alps and Umbria Marche Apennines (Apulian Plate, Southern Tethys) and Hawasina Complex (distal Arabian Margin), the radiolarian Unitary Associations have proved to be a useful tool for correlation.

Precise correlation of the new radiolarian zonation, based on the co-existence of several species within one zone, to most of the previous radiolarian zonations is impossible or very difficult, because most of them were defined by first or last appearances of one or two "marker" species, which may greatly differ from section to section.

The time span covered by the new radiolarian biozones is variable. Zone E2 has a duration of less than 1 million years whereas zone E1b spans about 4 million years. Zone E2 is located in the Middle Valanginian at the base of the magnetic polarity zone M11 and corresponds, in the Southern Alps, to a time of elevated $\delta^{13}C$ values (Weissert & Lini, 1991). During this characteristic period, explained by the authors as an episode of greenhouse climate, pelitic intervals, elevated bioturbation and cyclic sedimentation occurred. The same interval (Zones E2 and F1 corresponding to the Middle and the Upper Valanginian) is also characterized by the high abundance of some taxa in the samples of the Fiume Bosso section.

All the 175 taxa investigated, of which 1 new subspecies, 61 new species and 2 new genera, are described and illustrated in the systematic part of the thesis.