Session: Palaeopalynology I

Life cycle of the Early Cambrian acritarchs

M. Moczydlowska-Vidal

Uppsala University, Earth Sciences, Palaeobiology, Norbyvägen 22, SE-752 36 Uppsala, Sweden. E-mail:malgo.vidal@pal.uu.se

The Early Cambrian radiation of phytoplankton was one of the most prominent biotic events during this age and it has resulted in the appearance of numerous new species with complex morphology and multi-modal dimensions. This association of microbiota, called informally acritarchs, lasted for ca. 15-20 million years (Myr), coinciding with the appearance of several clades of bilaterian metazoans, and became largely extinct before the end of Cambrian. Acritarchs are heterogeneous in their origins and may include algae, cyanobacteria and perhaps fungi. Based on phenetic morphological features alone, around 100 or so Early Cambrian form-species have been described. However, because some species of microbiota produced various, morphologically distinct stages in their life cycle, which may be preserved and thus recognized as separate form-species in fossil records, the apparent number of species is overestimated and burdened with some error. Acritarch form-species reflect in fact the morphological disparity of phytoplankton, displayed by ornamented cysts, internal dormant/ reproductive cells and external vegetative envelopes that may pertain to a single species, and various ecological variants of discrete species. Although phytoplankton disparity does not correspond strictly to its biodiversity, it has been simplified as such in the biodiversity curves constructed on the form-species counts. Set in a chronostratigraphic frame, it can be seen that the relative change of phytoplankton between time slices reflects the "waxing and waning" of phytoplankton disparity and biodiversity, although not as a true count of taxa, which may never be accurately deciphered in the fossil record.

Some acritarchs represent various green algae classes but many are still of unknown biological affinities. Palaeobiology and relationships with extant microbiota of some taxa, with emphasis on their life cycle, reproduction and environmental adaptations, may be inferred from phenetic features and cell wall ultrastucture. Microfossils from the Lower Cambrian successions are studied to reveal the wall ultrastructure and to recognize by morphological and ultrastructural means the relationships between various phenotypes. Acritarchs are considered in gross to be preservable cysts of unicellular algae. Formation of the cyst, the excystment structure (pylome) and alternation of the generations (sexual and asexual) in the life cycle of unicellular microbiota may shed the light on the development of early adaptations and strategies to survive ecological crises events and as a competitive advantage in the increasingly complex marine ecosystem.

A morphologically distinctive and diverse plexus of the Early Cambrian genus *Skiagia* Downie, 1982 is characterized by the presence of processes with innovative funnel-shaped tips but otherwise it shows a re-combination of other features such as shape of processes,

their abundance, and various proportions of process length and vesicle diameter. The genus high disparity resulted in a number of species described but it may reflect instead the infraspecific variability, ecological adaptation and/or various stages in the development of this cyst-builder. The discovery of specimens with the internal body suggests that the *Skiagia* microorganism produced process-bearing cyst, the outer envelop surrounding the cyst or a vegetative cell occasionally preserved, and a reproductive/dormant internal cell. There are probably three stages in the life cycle of *Skiagia* although only the acanthomorphic cysts are commonly preserved as Cambrian microfossils. This first record of the acanthomorphic cyst with internal fruiting cell is from South Australia, the Arrowie Basin, but the genus *Skiagia* is worldwide distributed in the Lower and Middle Cambrian strata.

Cretaceous palynostratigraphy of Southeastern Anatolia, Turkey

K. Ertug & Z. Bati

Turkish Petroleum Corporation Research Center. Mustafa Kemal Mah. 2 cad. 86. 06520, Ankara, Turkey.

Southeast Anatolian Region is located at the northern edge of the Arabian Plate. Following Neocomian nondepositional period, five shallowing upward cyclic sedimentational phases were distinguished in the Southeastern Anatolia during Cretaceous (Ertug 1991). In an ascending order, Aptian-Albian Areban Formation, Cenomanian Derdere Formation, Santonian A-member of Karababa Formation, Campanian Karabogaz Formation and Maastrihtian lower-member of Germav Formation were deposited in the SE. Anatolia related to regional transgressions at the beginning of the sedimentational phases (Bond 1972, Ertug 1990, Ertug *et al.* 1990). Although, some parts of Cretaceous sediments are palynologically barren due to the unsuitable lithologies, these transgressional successions consist of shale, marl and limestone intercalations, and yield rich and well-preserved palynomorph assemblages consist of dinoflagellates, spores-pollen and acritarchs of which for the stratigraphic purposes, dinoflagellate cysts turned out to be the most indicative group of palynomorphs.

The purpose of this study is to document the dinoflagellate, spores-pollen and acritarch assemblages from these units and discuss their bio-chronostratigraphic correlations with similar Cretaceous successions in adjacent areas. For this purpose, 21 wells have been palynologically studied, and 67 dinoflagellate species belonging to 36 genera, 34 spores-pollen species belonging to 21 genera and 4 acritarch species belonging to 2 genera have been determined. Morphology and taxonomy of some selected taxa are also discussed (Herngreen & Chlonova 1981, Srivastava 1972).

References:

BOND, T. A. 1972. A lower Cretaceous (Aptian-Albian) palynological assemblage from the Dequeen Formation, Pike County, Arkansas. *Pollen Et Spores*, 14(2): 173-187.