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An overview of the Cretaceous stratigraphy and facies development of the Yazd Block, western Central Iran

Markus Wilmsen (1), Franz Theodor Fürsich (2), and Mahmoud Reza Majidifard (3)

(1) Senckenberg Naturhistorische Sammlungen Dresden, Museum für Mineralogie und Geologie, Sektion Paläozoologie, Dresden, Germany (markus.wilmsen@senckenberg.de), (2) GeoZentrum Nordbayern, Fachgruppe PaläoUmwelt, Friedrich-Alexander-Universität Erlangen-Nürnberg, Erlangen, Germany, (3) Geological Survey of Iran, Box 131851-1494, Tehran, Iran

The Cretaceous succession of the Yazd Block, the western of three structural blocks of the Central-East Iranian Microcontinent (CEIM), is in excess of 5,000 m thick. It has been studied in two key regions, i.e. the Khur and Yazd areas. Deposition started in both areas with terrestrial conglomerates and sandstones (Upper Jurassic?–lower Lower Cretaceous), covering Palaeozoic–Triassic basement rocks, weakly metamorphic rocks of the Upper Triassic–Liassic Shemshak Group or Jurassic granites. The basal unconformity is related to the Mid-/Late Cimmerian tectonic events (Bajocian and Jurassic–Cretaceous boundary interval) and shows a pronounced palaeo-relief. Thus, thicknesses of the basal terrestrial units (Chah Palang Formation and Noqreh formations in the Khur area, Sangestan Formation around Yazd) varies significantly from 0 to >1,500 m due to the levelling of the palaeo-relief. In the upper parts of the Noqreh and Sangestan Formations, interbedded terrestrial to marginal marine sediments indicate increasing marine influences during the Barremian. The following units, the Shah Kuh and Taft formations, comprise thick-bedded, micritic carbonates with abundant orbitolinid foraminifera, calcareous algae and rudists, attaining thicknesses of up to 1,000 m. They have a (late) Barremian–Aptian age and represent widespread shallow-marine carbonate platforms. Along an inter-regional drowning unconformity, the Shah Kuh and Taft carbonate platforms are overlain by up to 1.500-m-thick marly basinal sediments of late Aptian to Upper Albian age (Bazyab and Darreh-Zanjir formations). They characterize the maximum deepening in the Khur and Yazd areas during the Cretaceous period, related to significant subsidence rates. The following uppermost Albian–Middle Turonian Debarsu Formation (Khur area) is up to 600 m thick and consists of marls and bioclastic limestones, representing a carbonate ramp system prograding into the basinal system. It has a so far unnamed lithostratigraphical equivalent in the Yazd area where it is followed by undifferentiated Upper Cretaceous inoceramid-bearing hemi-pelagic limestone. These are capped, along an erosional unconformity, by conglomerates and shallow-water carbonates with large benthic foraminifera of Late Campanian?–Maastrichtian age. In the Khur area, the Haftoman Formation (Coniacian–Campanian, up to 1.000 m) overlies the Debarsu Formation (and older units) unconformably. Above a huge basal conglomerate, the formation is characterized by shallow-water limestones of a large-scale epeiric platform. The Cretaceous succession of the Khur area is concluded by the up to 250-m-thick Upper Campanian–Maastrichtian Farokhi Formation (shallow basinal marls and shallow-water limestones), resting unconformably on the Haftoman Formation. The Cretaceous succession is capped by an unconformity at the base of the Palaeocene Chupanan Formation.

The new data obtained on the age, thickness and depositional environments of the Cretaceous formations of the Khur and Yazd areas as well as on their bounding unconformities now allow a much better understanding of the complex geodynamic history of the Yazd Block. Major tectonic unconformities are recognized at the base of the succession (Mid-/Late Cimmerian Event), at the top of the Shah Kuh and Taft formations (Late Aptian), at the base of the Haftoman Formation (Late Turonian–Early Coniacian), at the base of the Upper Campanian–Maastrichtian formations, and in Cretaceous–Palaeogene boundary interval. Their inter-regional character indicates that the controlling factors are of supra-ordinate importance and probably related to synsedimentary tectonic movements affecting the CEIM and surrounding microplates.