



High resolution biostratigraphy of the K/T boundary in Higran section , Shaqlawa area northern Iraq

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The Higran section in northern Iraq exposes the contact between two widely recognized formations. They are the Shiranish and Kolosh formations , considered to be of Cretaceous (Campanian-Maastrichtian) and Tertiary (Paleocene-Eocene) ages respectively. Samples were taken from above and below the physical contact between the two formations at 5 to 7 cm apart. Planktonic foraminiferal biostratigraphic analysis of the Higran section indicates that the Cretaceous / Tertiary boundary in this section is hitherto the most complete and expanded section in Iraq up to date. Quantitative high resolution foraminiferal biostratigraphic analysis has shown that a major biotic change in the planktonic foraminifera occurred during the end of the Cretaceous to the beginning of the Tertiary. The Maastrichtian *Gansserina gansseri* and the *Abathomphalus mayaroensis* Zones were recognized . The *Abathomphalus mayaroensis* Zone was subdivided into three subzones they are : *Racemiguembelina fructicosa* Subzone , *Pseudoguembelina hariaensis* Subzone and part of *Pseudoguembelina palpebra* Subzone . The defined Tertiary zones are : *Guembelitria cretacea* Zone, *Parvularugoglobigerina eugubina* Zone, *Parasubbotina pseudobulloides* Zone and part of the *Parasubbotina varianta* Zone. This study has established the absence of the *Plummerita hantkeninoides* Zone within the Cretaceous succession indicating a hiatus between the Cretaceous and Tertiary successions. The planktonic to benthonic ratio of the Shiranish Formation across the K/T boundary shows the role of the outer shelf to upper slope environments well above and below the K/T boundary in the section, hence it is characterized by lithologic continuity and a short missing interval. The planktonic foraminiferal extinction in the Higran section occurred gradually and over a long period. Seventeen species (40.5% of the Cretaceous species) became extinct in the Late Maastrichtian before the first appearance of the Tertiary species , whereas nineteen

species (45.2%) disappeared exactly with the hiatus that defines the K/T boundary in the studied section. Most of the extinct forms are large, complex, tropical and subtropical. Nevertheless, the small surface dwellers cosmopolitan generalists with simple morphologies (14.3% of the Cretaceous species) survived the K/T boundary and the drastic change in the ecosystem. They did however become extinct in the Early Danian. The fine biostratigraphic analysis also revealed that the K/T boundary is located in the same lithology of blue marls within the Shiranish Formation, rather than at the contact between the Shiranish and Kolosh formations. This study has shown that the well known Shiranish Formation conventionally taken to be of Cretaceous age, actually extends into the Paleocene in the Higran section. In essence, the turn over of the Cretaceous foraminifera which defines the end of the Cretaceous is located one meter below the physical contact between the Shiranish and the Kolosh Formations .