Chapter 8
Late Visean to Late Bashkirian Fusulinids (Foraminifera) From Kirchaou KR–1 Borehole Southern Tunisia

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ABSTRACT

The study of the Carboniferous foraminifera of the Kirchaou KR-1 borehole allowed to define and delineate the Bashkirian interval in Tunisia. A biozonation, which includes six subzones, is proposed. The Mississippian-Bashkirian transition is located at 2730 m. The Bashkirian-Moscovian boundary, characterised by the presence of the zonal markers Tikhonovichiella and Citronites, is found at 2517 m. Bashkirian covers the interval from 2730 m to 2517 m. The comparison with the BMT-1 borehole, and other wells in the area, helps provide the intervention of the Hercynian orogeny, which locally eroded all the previous Carboniferous deposits, and in some boreholes parts of Mississippian or Pennsylvanian sediments. A comparison of Mississippian fossil assemblages indicates that Tunisia belongs to the western-Tethyan bioprovince like Cantabric Cordillera (Spain) and Donbas

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(Ukraine) during the Bashkirian.

INTRODUCTION

Over recent years, the Bashkirian has been examined and discussed in the southern Urals and adjacent regions of the East European Platform in Russia, including the Donbas in Ukraine (Kulagina et al., 2001) and the Cantabrian Mountains in northern Spain (Villa, 1995; Villa et al., 2001; Villa and Merino-Tomé, 2016; Sanz-López et al., 2018). Its lower boundary has been modified (Kulagina et al., 2000; Leven et al., 2006; Leven and Gorgij, 2011) and currently this boundary is characterised by the FAD (First Appearance Datum) of the conodont *Declinognathodus noduliferus*, which appears at the base of the *Homoceras* Zone of the cephalopod scale (Leven and Gorgij, 2011).

Currently, the Carboniferous System is subdivided into two sub-systems, the Mississippian (Lower Carboniferous) and the Pennsylvanian (Upper Carboniferous), in which a total of seven 'global' stages are recognised (Tournaisian, Visean, Serpukhovian, Bashkirian, Moscovian, Kasimovian, and Gzhelian). The Bashkirian stage includes five sub-stages: Syuranian, Akavassian, Askynbashian, Tashastinian and Asatausian (Kulagina et al., 2001; Postanovleniya et al., 2006; Lucas et al., 2021; Vachard and Le Coze, 2021; Ueno, 2022; Kobayashi and Vachard, 2022; Fassihi et al., 2023).

In Tunisia, there are no outcrops of Paleozoic deposits, with the exception of Jebel Tebaga of Medenine, where Capitanian (Middle Permian) marine strata are exposed. Paleozoic rocks have only been identified by drilling in various basins in southern Tunisia (Jeffara and Ghadames). Oil exploration in southern Tunisia began in 1956 with oil Tunisian company of Petroleum Research and Exploitation (SEREPT), which began to drill several boreholes in the Paleozoic sedimentary series. Having the opportunity to revise the Carboniferous (especially the Bashkirian) of southern Tunisia at Kirchaou licence, we chose the most complete drilling Kirchaou KR-1 for a detailed biostratigraphic study. The aim of this work is to revise the Bashkirian fusulinids, define the stratigraphic markers in order to establish biozones, and finally make a comparison with the BMT-1 borehole and other boreholes that crossed this interval (KLF-1, HBR-1, MHB-1, GT-1, LG-3). Then, the correlation of the fusulinid assemblages is extended to those of Spain, Urals, and Ukraine.