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The Bahi Formation – Its stratigraphic position, western Sirt Basin, Libya

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تكوين الباهي – وضعه الطباقي (الإستراتجرافي) بمنطقة غرب حوض سرت، ليبيا

ميلاد علي غميض

يعتقد أغلب الجيولوجيين أن العمر النسبي لصخور تكوين الباهي في منطقة غرب حوض سرت ينتمي إلى ما قبل عصر الماستريخشان غير أن هذه الدراسة تشير إلى إحتمال أن يكون عمر الجزء العلوي من هذه الصخور في بعض أجزاء المنطقة أكثر حداثة من ذلك وربما يصل إلى عصر الدينيان. وتوصي هذه الدراسة بمزيد من التمحيص بالنسبة لعمر هذا التكوين ووضعه الطباقي (الإستراتجرافي) نظراً لأهميته كصخر حامل للنفط في بعض الحقول. ولتحقيق هذا الهدف ربما يمكن إستخدام الطفل المحتوى والبالينومورفات وكذلك العناصر المشعة بمعدن الجلوكونايت الموجود بالتكوين.

The subsurface marine succession in the western Sirt Basin (Fig. 1) is normally underlain, in many places, by a sandstone unit known as the Bahi Formation. Lithologically, it commonly consists of sandstone and pebbly sandstone with a clay matrix and interbeds of siltstones, conglomerates and shale and its thickness varies from zero to a maximum of over 400 feet (Barr and Weegar, 1972).

The Bahi Formation unconformably overlies various lower Palaeozoic rocks, mostly Cambro-Ordovician Hofra Formation (Orthoquartzites) and is overlain by marine sediments with a sharp and conformable to gradational contact (Fig. 2).

The generally mottled nature of the siltstones and shale and the red staining of the sand grains may indicate a continental origin. The presence of glauconite in the uppermost 10-20 feet could be considered as a sign of marine origin.

The thickness variation is believed to have had been caused principally by the palaeotopography. The provenance, being mostly continental, the time span of its subaerial exposure, therefore, is expected to have had also played a very significant role in this variation. This role can obviously be explained by the act of weathering and erosion processes on the highs accompanied by the settling of the yielded product in the lows.

The age of Bahi Formation in western Sirt Basin seems to have had been suggested during the early stages of exploration for oil and had never been changed in the work that followed. It was considered older than Maastrichtian (Barr, 1972, Barr and Weegar, 1972 and Sughair, 1992). This inferred age decision had, most likely, been based on the assumption that the total inundation of Sirt Basin took place during the Maastrichtian Stage and, consequently, marine carbonate deposits were assumed to have had been laid down all over the basin during this stage. In this case, the provenance and the site of deposition of this formation, which are mainly continental, were

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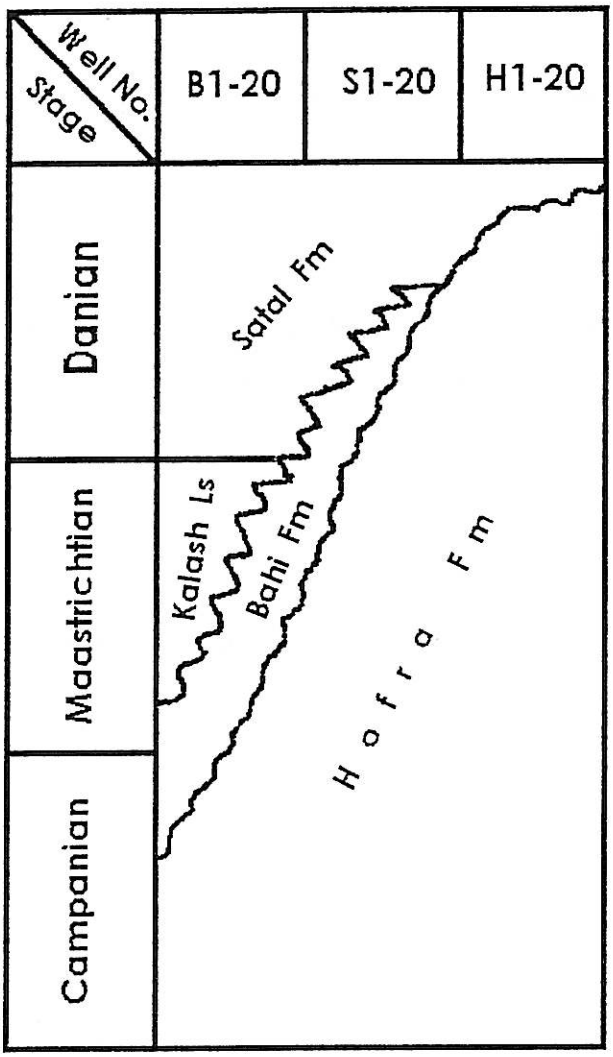


Fig. 1. A map showing the geographical distribution of the Danian Islands (eminences).

both considered non-existent after the Campanian Stage or early Maastrichtian time.

The age aspect of this formation, however, does not seem to have received enough attention from geologists. Its virtual barrenness of fossils had possibly contributed to the difficulties faced in its age determination and, therefore, it was decided stratigraphically.

The idea of throwing some light on this aspect occurred to the author during a regional investigation of the Palaeocene succession in the area (Ghummed, 1997). The interest in this problem arose from finding out that the minimum thickness of the Danian marine strata (limestone overlain by shale) is occurring in H1-20 well, where it is found in direct contact with the Hofra Orthoquartzites. This minimum thickness, measuring less than 120 feet, is considered less likely to represent the full Danian time by all measures. Therefore, a considerable time-proportion of the Danian Stage is considered to be represented by non-deposition and, most likely, erosion at this location. This proportion could be as high as four fifths of the stage as can be figured out knowing that the thickness of the Danian marine strata, where fully developed, is normally about 1000 feet, especially in the relatively stable areas. This perhaps can be interpreted, in terms of time that Hofra Formation remained, in some parts of the area, subaerially exposed for a considerable period of time during the Danian Stage. This period is unlikely to have had no impact on the exposed rocks with regard to weathering, erosion and deposition.

The present work, however, shows quite clearly that Hofra Formation continued subaerially exposed in many parts of the area, especially in the so-called Azzahrah-Al Hufrah and Al Bayda platforms (Fig. 1), until sometime through the Danian Stage forming some sort of islands (eminences). These islands are considered to be the sole source of the sand found in the area. It is normal, however, to expect that these bold areas to be subjected to weathering and erosion and, eventually, the settling of the product of these processes in their environs. Therefore, it is quite possible to consider part of Bahi Sandstone to be Danian in age.

The sandstone thickness in these islands varies from zero to over 300 feet in places. The Maastrichtian-Danian contact within this formation is rather difficult to place in many cases, whereas in others it is possible to consider the whole sand as belonging to the Danian, e.g. in UU1-11 Well where more than 300 feet of strata consist of interbedded sandstone and chalk (based on stratigraphical correlation). This interbedding is undoubtedly an additional very sound proof of assigning a Danian age to, at least part of, this sandstone because the chalk is most likely Danian deposits.

The onlapping nature of the formation and the certainty of subaerial exposure of its source during Danian allow the suggestion that it does not only straddle stratigraphically the Campanian-

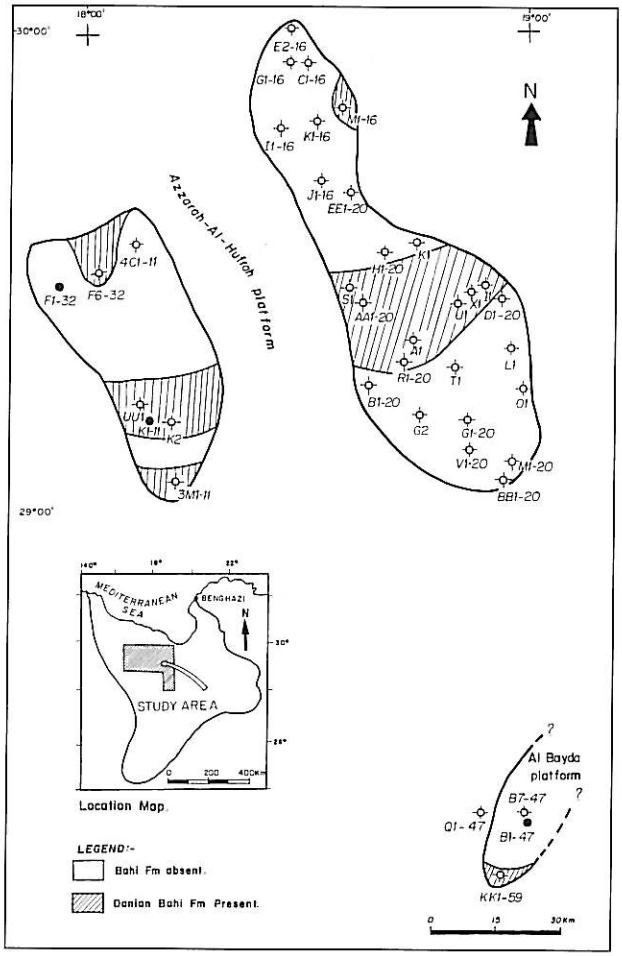


Fig. 2. A sketch diagram showing the inferred occurrence of the Bahi Fm.

Maastrichtian boundary, but also that of the Cretaceous-Tertiary and, therefore, its age can rightly be considered extending into Danian. The re-investigation of the formation with regard to its age is strongly recommended. To achieve this goal it is perhaps possible to use the contained shale and palynomorphs in addition to isotopic age dating on the glauconite present in the formation.

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