

**STRATIGRAPHIC STUDY OF MS'AD FORMATION
EAST OF RUTBAH – KILO 160 AREA,
WESTERN DESERT, IRAQ**

REPLY

Reda M. Amer¹

Sir,

Herewith is a point-by-point reply to the discussion of Mrs. Sahira M. Karim concerning the aforementioned published article.

The age and stratigraphic succession of the exposed and subsurface rocks, and according to the foraminiferal assemblages two important planktonic species were determined: *Rotalipora greenhornensis* (RENZ) of Late Cenomanian age and *Helvetoglobotruncana helvetica* (BOLLI) of Turonian age, accordingly two biozones were identified:

- *Rotalipora greenhornensis* Zone, which includes index planktonic foraminiferal species, like *Rotalipora greenhornensis* (RENZ), *R. cushmani* (MORROW) and *R. appeninica* (RENZ).
- *Helvetoglobotruncana helvetica* Zone, which includes index planktonic foraminiferal species that have appeared and extended in this zone, like: *Marginotruncana renzi* (MORROW), *M. schneegansi* (SIGAL) and *M. angusticarinata* (GANDOLFI).

1. Figure 3, page 27 (upper 4 m) Section 5/2174, Wadi Horan the pelletal dolomite looks like lithologically with the lithology of Ms'ad Formation, accordingly it is included with the *Helvetoglobotruncana helvetica* Zone. The exposed rocks in the section are of shallow marine environment, beside the presence of the planktonic foraminifera, due to opening of the sea.
2. Figure 4, page 28. Section 6/1501, Wadi Horan, it is a typing mistake.
3. Figure 5, page 29. Section 43/A, Wadi Fadhwa. The nomenclature of *Helvetoglobotruncana helvetica* Zone was based on the presence of the identified index planktonic foraminiferal species *Marginotruncana renzi* (GANDOLFI), which is extended and spread in this zone and the upper 4 m (Ferruginous sandstone), lithologically it is similar to the lithology of Ms'ad Formation, also they belong to this zone.
4. Figure 6, page 30. Section 67/BS1, Wadi Amij, presence of index planktonic foraminiferal species: *Marginotruncana renzi* and *M. schneegansi*, which appeared and extended with *Helvetoglobotruncana helvetica* (BOLLI) in the same zone.
5. Figure 7, page 31. Section 77/BS2, Wadi Duwaikhlat Amij (ditto).
6. Figure 8, page 32. Section 44/789, Al-Amghar hills. Represents the same lithology of Ms'ad Formation.
7. Figure 9, page 33. Borehole A'awaj 1, the upper 60 m, resembles the lithology of Ms'ad Formation.

¹ Senior Chief Geologist (retired), Iraq Geological Survey.
e-mail: reda_amer44@yahoo.com

8. The planktonic foraminifera *Taberina cubana* was found with the planktonic foraminifera *Helvetoglobotruncana helvetica* (BOLLI) and *Marginotruncana renzi* (MORROW) of Cenomanian age.
9. Figure 13, photograph 1, The Rutbah Formation was mentioned in the Introduction and the Conclusions of the published article (P. 37 and 46, respectively), and indicates interfingering of the upper part of Rutbah Formation with the lower part of M'sad Formation, in Wadi Horan.
10. Any formation is defined according to its lithological constituent and the present fauna, also from studying of the lithological constituents and stratigraphic correlation. These studied parameters indicated that the lithological facies resemble those of Ms'ad Formation, which was studied by Henson (1940) in Bellen (1959), Buday and Halk (1980) and Opletal and Rejchrt (1992) and indicated that the section represents one formation (Ms'ad). The lithological succession of the studied stratigraphic section includes many sedimentary cycles of dolomitic limestone and sandy limestone, this is attributed to the fluctuation of the sea level and rapid sea transgression followed by sea regression, consequently, marine shore environment was developed and sandy layers were deposited. It is worth mentioning that the carried out previous works are mentioned in p. 21.
11. The *Orbitolina* cf. *discoidea* GRAS and *Orbitolina* cf. *concava* HENSON, were identified in borehole A'awaj 1 at the depth of 120 m., they are associated with the index planktonic foraminiferal species *Rotalipora greenhornensis* (RENZ), which indicates Late Cenomanian age. However, the age of Maaddud Formation is Albian – Early Cenomanian.

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