

Two New Species of Acritarchs From the Ordovician of Iraq

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ABSTRACT

Two new distinctive species of acritarchs belonging to genus *Fractoricoronula* are described from strata of Late Ordovician Epoch in borehole Khleisia-1 in Iraq. These are *Fractoricoronula densa* sp.nov. and *Fractoricoronula khabouri* sp.nov.

وصف نوعين جديدين من الأكريتارك من الأوردوفيشي في العراق

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الملخص

شملت الدراسة تصنيف ووصف نوعين جديدين من طحالب الأكريتارك التي تعود إلى الجنس *Fractoricoronula* من صخور الأوردوفيشي الأعلى في بئر خليصيه - 1 في العراق وهما: *Fractoricoronula khabouri* sp.nov. و *Fractoricoronula densa* sp.nov.

INTRODUCTION

The oldest rock unit exposed in northern Iraq is the Ordovician Khabour Formation which crops out in narrow limited zone in the core of Ora, Chalki and Kaista anticlines in north and northwestern Amadia district (Bellen *et al.*, 1959). In the western side of Iraq the oldest rock unit exposed is the Ga'ara Formation (Late Carboniferous – Permian) in the Ga'ara depression.

Due to the limited outcrops exposure the information about the Paleozoic Formations were obtained from the deep wells, which drilled in the area between Khleisia and Mosul city and the studied well is one of these (Fig. 1). The studied

samples were collected from borehole Khleisia-1, which is located at 35°19'21.3"N, 41°38'18"E at Khleisia anticline northwestern Iraq, the total depth of the well is (3791.4m.) and the studied section is between depths (3400.0 - 2543.5m) penetrating Khabour Formation (Fig. 2).

The Paleozoic sedimentary strata fall into three characteristic major sedimentary cycles, separated by relatively major breaks, indicating the effects of the Caledonian and Hercynian orogeneses. One of these cycles is the Cambrian – Ordovician – (?Silurian) cycle represented in Iraq mainly by the Khabour Formation (Buday, 1980).

Bellen *et al.*, 1959 and other earlier authors included the Pirispiki Red Beds and Chalki Volcanics in this cycle (Buday, 1980). Seilacher, 1963 in Buday, 1980 proved that Pirispiki Red Beds and Chalki Volcanics belong to the next cycle (Devonian – Lower Carboniferous) cycle and were deposited after the Caledonian uplifted.

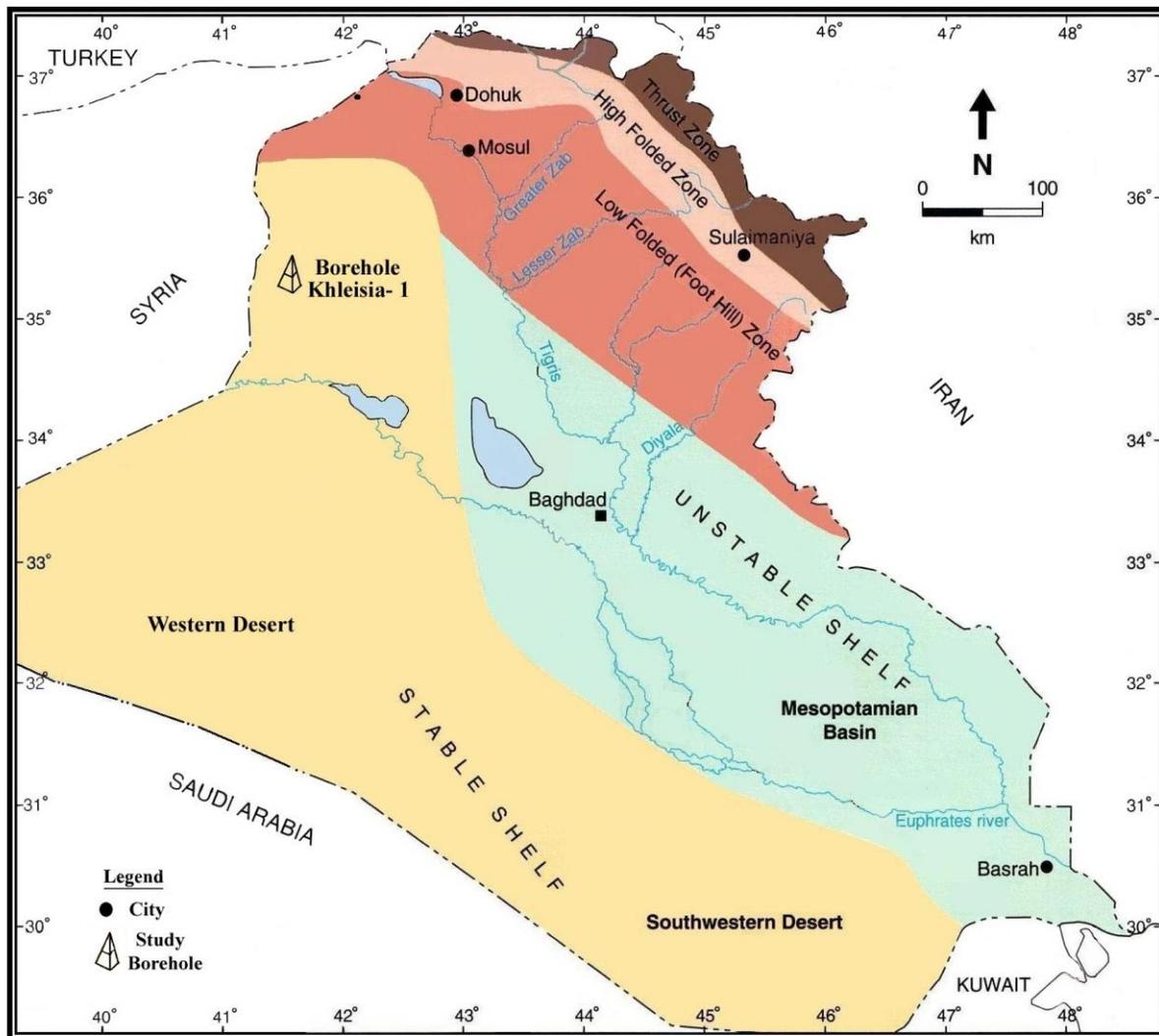


Fig. 1. Locality Map Showing the Location of the Studied borehole Khleisia – 1.

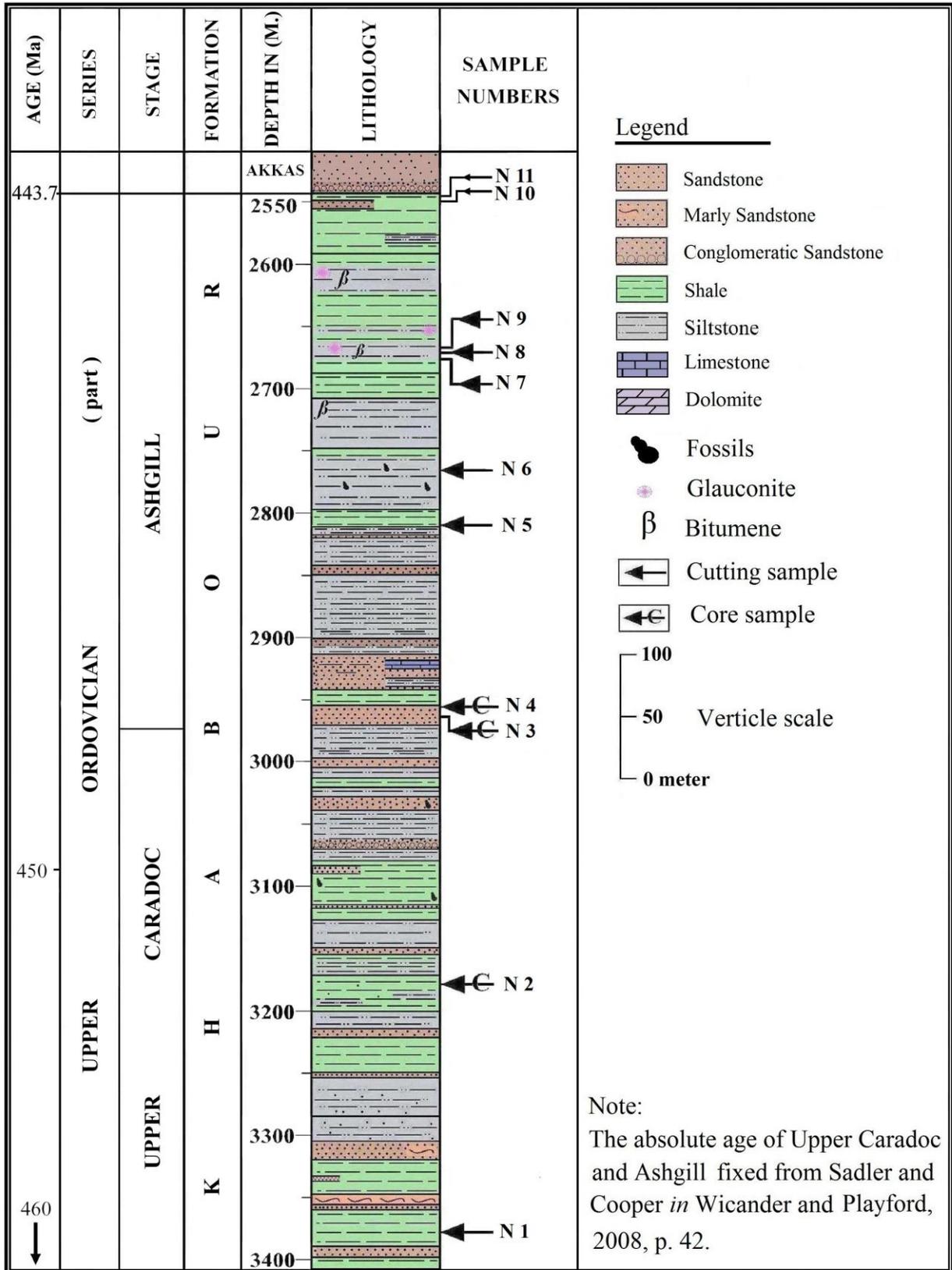


Fig. 2: The Studied Stratigraphic Succession of Borehole Khleisia –1.

STRATIGRAPHY

The Khabour Formation was first defined by Wetzel, 1950 in van Bellen *et al.*, 1959 in the northern thrust zone, which named after the Khabour river in the vicinity of Amadia district, north of Iraq. The exposed part of the type section is (800m) thick (base not reached). The outcrop portion of the Formation is purely clastic composed of thin bedded, fine grained sandstone and silty micaceous shale (Buday, 1980) (Fig. 2).

According to the palynological study the Khabour Formation was deposited in the inner-middle shelf, under low energy water (Al-Mola, 2009).

MATERIAL AND METHODS

Eleven samples were taken from Iraqi Exploration Oil Company representing depths (3400.0–2543.5m), these samples have been treated with the standard method in preparing palynological samples by adding HCl to dissolve carbonates, HF to dissolve silicates and with HNO₃ to oxidize organic matters from the samples.

SYSTEMATIC PALYNOLOGY

INCERTAE SEDIS

Informal Group ACRITARCHA Evitt, 1963

Genus *Fractoricoronula* Colbath, 1979 emend. Turner, 1984

Type species: *Fractoricoronula cubitalia* Colbath, 1979, p.15, pl. 5, Figs.1-5,
(by original designation)

Fractoricoronula densa sp. nov.

Pl.1, Figs.1-6

2009 Genus A Al-Mola p.109-110, pl. 21, Figs.11–16, pl.22, Figs.1-4.

DESCRIPTION

Vesicle triangular, sides straight to convex, angles rounded, three processes arise from the vesicle, one process at each angle in the plain of vesicle, processes conical, flexible, the proximal side of the process is closed by inner wall or plug (2-3µm)

length and (2.5-5 μ m) wide, the processes terminated with acuminate tip. The vesicle wall is (3 μ m) thick while the processes wall (1 μ m) in thickness, both walls are laevigate. Excystment structure is observed in some specimens as epitache between any two processes.

Holotype: Depth (2766.0 m.), slide number (N6), Fig.1, R 1.5/128.7, size 45 μ m.

COMPARISON

This species is differed from *F. cubitalia* Colbath, 1979 by it is thicker vesicle wall and smooth ornament for both vesicle and processes wall and from *F. trirbetica* Turner, 1984 by the process length (which is less than the vesicle length), conical shape and thicker vesicle wall.

MEASUREMENTS

Vesicle size in (μ m)	Process length in (μ m)	Width of process base in (μ m)	Specimens measured
28 - 49	16 - 45	2.5 - 5	27

Name Derivation: Greek *densa*, thick.

Fractoricoronula khabouri sp. nov.

Pl.1 Figs.7-9

2009 Genus A Al-Mola, p.110, pl.22, Figs. 5-7.

DESCRIPTION

Vesicle triangular, sides straight, angles rounded, three processes arise from the triangular angles in the plain of vesicle, the forth process arises from the vesicle face near one of the angles, processes conical and flexible, the proximal side of the process is closed by inner wall or plug (2-3 μ m) length and (2.5-5 μ m) wide, the processes terminated with acuminate slender tip.

The vesicle wall is (2-3 μ m) and the processes wall (1 μ m) in thickness, both walls are laevigate. No excystment structure is observed.

Holotype: Depth (2810.30m.), slide number (N5), Fig.7, R 6.0/133.8, size 43 μ m.

COMPARISON

This species is distinguished from *Fractoricoronula densa* sp. nov. in having fourth process arising from the vesicle surface.

MEASUREMENTS

Vesicle size in (μm)	Process length in (μm)	Width of process base in (μm)	Specimens measured
43 - 47	21 - 45	3 - 4	5

Name Derivation: *Khabouri* after the Khabour river.

PLATE 1

Coordinates given are for the Olympus BH2 photograph with slide label on the left unless the coordinates are prefixed by R when the slide label is on the right.

1- *Fractoricoronula densa*, Holotype, N6, 2766.00m., R1.5/128.7, size 45 μm .

2- *F. densa*, N5, 3.6 / 132.6, size 49 μm .

3- *F. densa*, N8, R 9.1 / 131.1, size 43 μm .

4- *F. densa*, N3¹, R 5.2 / 125.2, size 40 μm .

5- *F. densa*, N4², 9.9 / 126.8, size 45 μm .

6- *F. densa*, N9, 10.4 / 121.2, size 43 μm .

7- *F. Khabouri*, Holotype, N5, 2810.30m., R 6.0/133.8, size 43 μm .

8- *F. Khabouri*, N6, 5.9 / 122.5, size 44 μm .

9- *F. Khabouri*, N2, 4.2 / 106.7, size 47 μm .

Plate (1)



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