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New Insertae Sedis Genus *Angelucysta* from the Lower Carboniferous Dinantian of Iraq

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ABSTRACT

A distinctive form of insertae sedis cyst is described in detail from samples of Ora, Harur Formations and Unit A in boreholes Kh5/1 and Khleisia-1. It constitute the monotypic base for new genus *Angelucysta* (type species *A mosuliana*). The form is associated with spore suite that is clearly representative of Early Carboniferous (Dinantian), so that it is considered as an index fossil for this age.

دراسة ووصف جنس جديد *Angelucysta* غير معروف الاصل من بالينولات الكاربوني الاسفل في العراق

الملخص

تم وصف وتسمية جنس جديد من البالينولات *Angelocysta* من خلال الدراسة التفـصيلية لنمـاذج مأخوذة من تكوينات اورا وهارور والوحدة A من بئري KH5/1 وخليصية-1، كما تـم تـسمية النـوع المثالي لهذا الجنس الجديد *Angelocysta mosuliana*.

اظهر هذا الجنس اهمية طباقية كبيرة من خلال اقتصار تواجده ضمن النماذج من عمر الكـاربوني المبكر (Dinantian) في التكوينات المدروسة مما يشكل دليل طباقي مهم لتحديد هذا العمر.

INTRODUCTION

During the course of detailed palynological studies of Carboniferous sediments in borehole Kh5/1 and Khleisia-1 (Fig.1), a morphologically distinctive form of insertae sedis cyst has been encountered. This form is restricted to the Lower Carboniferous succession, represented in the boreholes by upper part of Ora Formation (zone named Ora/Harur Formation Gaddo and Parker, 1959) and Harur Formation (both of Tournaisian) in age. In addition to that it was also recorded from Unit A (unnamed Formation), Visean in age in borehole Kh5/1 (Fig.2).

The purpose of this paper is to document this form and relate its occurrence to the palynostratigraphic sequence as presently known in Iraqi Carboniferous.

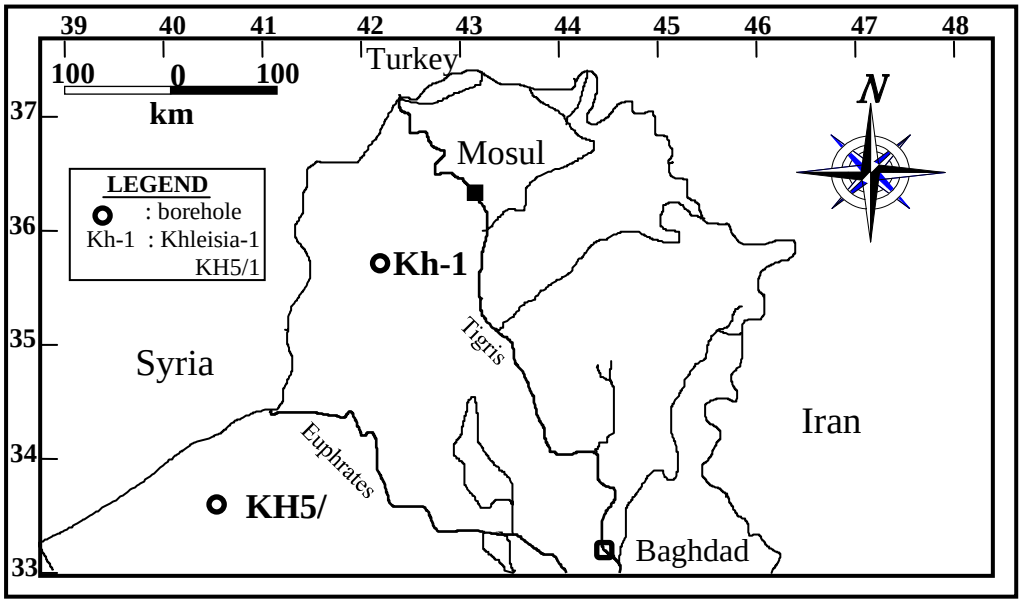

Fig. 1: Location map.

LITHOSTRATIGRAPHY

Ora Formation

The Ora Formation was first described by Wetzel (1952) in (Bellen et al., 1959). The type section of the formation in Ora fold (Amadia District). The formation was penetrated by the Khleisia-1and Kh5/1 boreholes, where the lithology is almost identical to that of the type section. The total thickness of the formation in borehole Kh5/1 is about 300m (AL-Hadidy, 2001) and it is Tournaisian in age, while it reaches a thickness of about 486m in borehole Khleisia-1 (Bellen et al., 1959) and extends in age from most Upper Devonian-Lower Carboniferous (the studied new genus was restricted to samples representing a transition zone named Ora Shale/Harur Limestone Formation (Gaddo and Parker, 1959). The zone is now considered to represent the Carboniferous part of Ora Formation.

The lithology of the Ora Formation is mainly consist of shale, mudstone, fine sandstone, siltstone interfingering with limestone tongues of the Harur facies. The formation is deposited in shallow marine environment.

Harur Formation:

The formation was first described by Wetzel and Morton (1952) in (Bellen et al., 1959). The thickness of the formation in borehole Kh5/1 is 86m. (AL-Hadidy, 2001), while it thickned in Khleisia borehole and attains a thickness of about 165m. The lithology of the formation is thin bedded black, organic detrital limestone with intercalation of black calcareous shale in the upper and lower parts. The environment of the formation is shallow marine.

Unit A (Unnamed Formation):

This unit is described by AL-Mola (2001) to represent the stratigraphic section in borehole Kh5/1 delimited from below by Harur Formation and from the top by Ga'ara Formation. The thickness of this unit is 126m, consisting mainly of alternation of sandstone and mudstone with organic material. This rock unit is varied mineralogically

and environmentally from that of Ga'ara Formation. The age of the unit is Tournaisian-Visean.

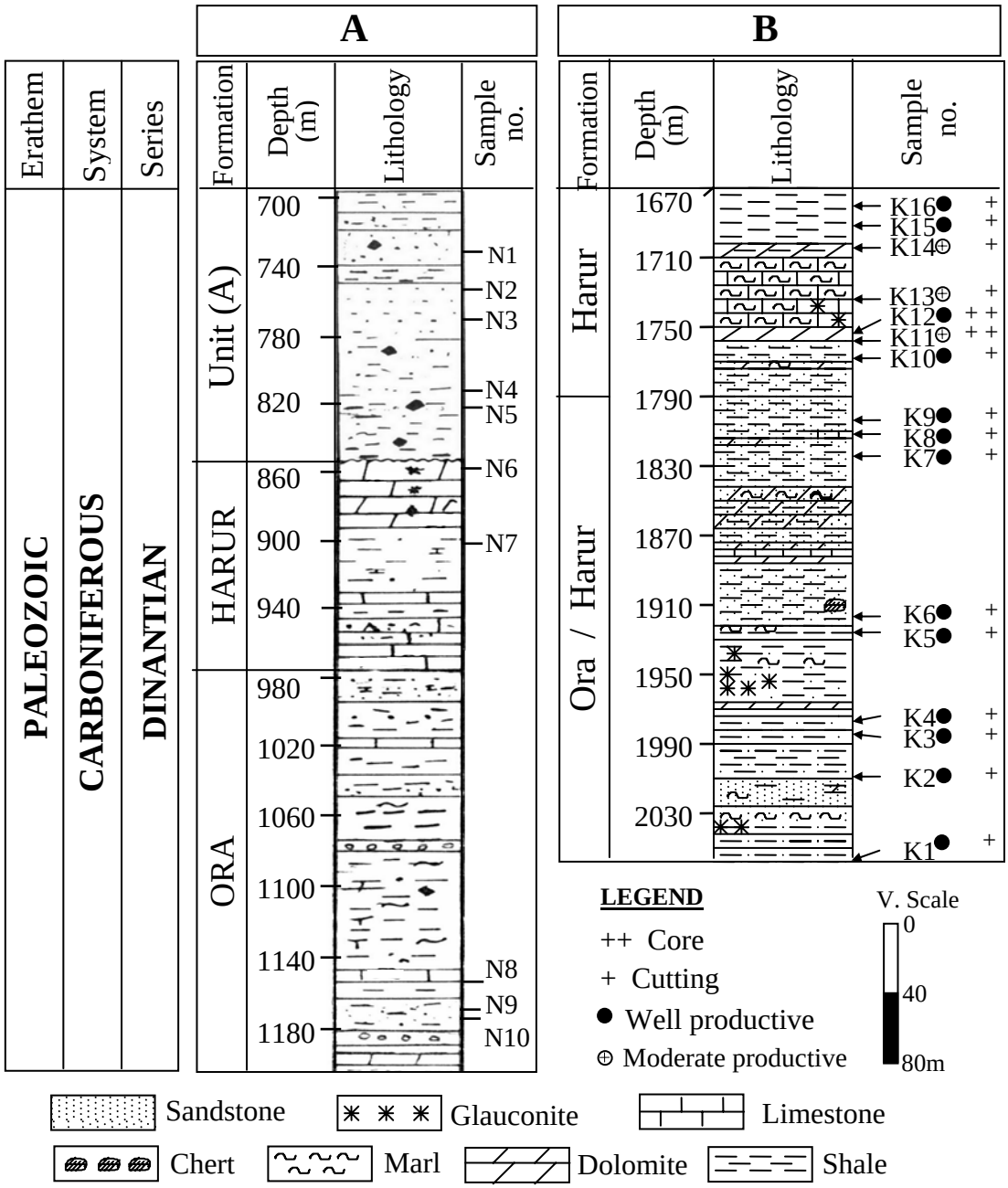

Fig. 2 :Stratigraphical succession of (A): KH5/1 borehole and (B): Khleisia-1 borehole.

SYSTEMATIC DESCRIPTION

Microfossils: insertae sedis.

Genus: *Angelucysta* Nader and Al-Hasson gen. nov.

Diagnosis: Cyst-like microfossils occurring as isolated individual, hollow or containing mass of amorphous material, usually fully occupied the cyst, but most specimens show

pointed end and has different color, which indicate that it lacks the amorphous material. Cyst usually elongate horn or trumpet shape, straight and usually coiled at the pointed end. The wide opened upper end usually funnel shaped, wall single layer about 3µm thick. Ornamentation laevigate.

Type species: *Angelucysta mosuliana* Nader and Al-Hasson sp. nov.

Occurrence: In boreholes Khleisia-1, KH5/1, from Ora / Harur Formation, Harur Formation, Ora Formation, Unit A (unnaned formation), Lower Carboniferous (Dinantian), Iraq

Comparison:*Tampanicysta* Balme (1979) from the Lower Triassic, Kap Stosch, Greenland is the only cyst-like form described in the palynological literatures. It differs from the present genus in having (in most specimens) a rim-like thickening of the wall surrounding a shallow depression at both end. In addition to that many individual linked into short linear chains like that of chitinozoa.

Derivation of name: The generic epithet *Angelus* (lat.) *or Angelos* means trumpet.

Discussion: A photograph of this genus was sent to many Carboniferous palynologist in different parts of the world, and they all indicate our first documentation of this genus:

This genus is a cyst-like so according to Balme (1979), there is little doubt that *Angelucysta* represents a mechanism for encystment, but its biological affinities are quite uncertain. If it derives from the plants Kingdom it may represent a stage in a fungal or algal cyst, but there seems an equal possibility that it is of animal origin.

Angelucysta mosuliana Nader and Al-Hasson sp. nov.

As the genus is at present monotype, the generic circumscription also serves as a description of the type species

Dimensions: 87(150)245 µm diameter for (30) specimens.

Holotype: Slide K8 L.115.4/10.1, size 254 µm pl.1, fig 1.

Paratypes: Slide K14-123.8/8.0, size 100 µm., pl.1, fig 2.
Slide K10-124.71/7.9, size 230 µm., pl.1, fig 3.
Slide K10-129.7/11.3, size 151 µm., pl.1, fig 4.
Slide K6-117.3/7.1, size 165 µm., pl.1, fig 5.

Derivation of name: After Mosul City, in Northern Iraq.

Plate 1

Plate-1
Figs. 1-5 *Angelucysta mosuliana* sp. nov.

1-holotype, Ora / Harur Fm., K8-115.4/10.1, size 254 µm.
2-paratype, Harur Fm., K14-123.8/8.0, size 100 µm.
3-paratype, Harur Fm., K10-124.71/7.9, size 230 µm.
4-paratype, Harur Fm., K10-129.7/11.3, size 151 µm.
5-paratype, Ora / Harur Fm., K6-117.3/7.1, size 165 µm.

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