

Palynostratigraphy and paleobiogeography of the Jurassic – Lower Cretaceous succession in Kabrit-1 well, northeastern Egypt



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ABSTRACT

Well-preserved and abundant Jurassic–Early Cretaceous palynomorph assemblages were recorded from the Kabrit-1 well, north Eastern Desert, Egypt. Thirty-one rock-cutting samples were analyzed and six rock units were differentiated. Seventy-one palynomorph species were identified from the productive samples. Six palynozones were differentiated, and they covered all the studied succession except for a palynomorph barren interval present in the uppermost part. These palynozones arranged in ascending order are as follows: two palynozones were recorded from the Middle–Upper Jurassic (*Gonyaulacysta jurassica* – *Lithodinia jurassica* Assemblage Zone and *Klukisporites pseudoreticulatus*–*Systematophora penicillata* – *Escharisphaeridia pocockii* Assemblage Zone) and the other four palynozones characterize the Lower Cretaceous deposits (*Pilosisorites trichopapillosus* – *Cribroperidium orthoceras* Assemblage Zone; *Dicheiropollis etruscus* Interval Zone; *Murospora florida* – *Afropollis operculatus* Assemblage Zone and *Afropollis jardinus* Range Zone). We infer open marine conditions during deposition of the lower part of the Khalig El Ayoun Formation (Oxfordian–Kimmeridgian) and within the Kharita Formation (Albian), and shallow marine or coastal environments during deposition of the remainder of the studied succession. Paleobiogeographically, Late Jurassic index terrestrial palynomorph species documented here are in common with those previously recorded from North Africa, while marine dinocyst species are common to those documented from the West European and North American province. During the Early Cretaceous, the recorded terrestrial microfloral species were similar to those previously recorded from the West African–South American Province, while the marine dinocyst species were still related to the West European and North American marine palynofloral province.

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1. Introduction

Few exploratory wells were drilled in the northern part of the Eastern Desert (Kabrit-1; Abu Hammad-1; Abu Sultan 1& 2; Q 71-1X; Q 72-1X; R 69-1; Sindy and Monaga-1 wells) relative to the more extensively explored north Western Desert due to the lower probability of oil and gas resources in the north Eastern Desert. During the last two decades, the palynostratigraphy of Jurassic and Cretaceous strata in Egypt, particularly in the north Western Desert, has been intensively studied (Table 1).

The studied well lies in the northeastern part of the Eastern Desert (south of Bitter Lake; on the western side of the Suez Canal)

at Lat. 30°12'17.17"N and Long. 32°29'53.94"E (Fig. 1). Kabrit-1 well was drilled by CONOCO in 1983 (total depth 9600 ft; 2926 m). The goal of the present work is to document the palynomorph assemblages present in the Upper Jurassic – Lower Cretaceous succession preserved in the Kabrit-1 well to provide insight into the paleoecology and paleobiogeography in the northern part of the Eastern Desert.

We analyzed thirty-one washed cutting samples from 4400 to 6850 ft (1341–2088 m) in Kabrit-1. Based on the data obtained from the well log of CONOCO in 1983, these strata range in age from the Late Jurassic (Khalig El-Ayoun Formation) to the beginning of the Cenomanian (Abu Roash Formation). All samples were prepared for palynological analysis following standard techniques. Palynomorphs were examined under 100× and 400×, up to 300 specimens were counted and identified in each sample. Photomicrographs are captured from the kerogen (unoxidized)

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Table 1
Selected previous palynological studies of the Jurassic–Cretaceous succession in Egypt.

Age	Western desert	Eastern desert	Sinai
Cretaceous	Saad & Ghazaly (1976), Sultan (1978), Aboul Ela (1979), Abdelmalik et al. (1981), Schrank (1982), Sultan and Aly (1986), Sultan (1987), El Shamma (1988), El Shamma and Arafa (1988), Omran, Soliman, and Mahmoud (1990), Mahmoud (1989 & 1991), Abd El-shafy & Abd El Moneim (1991), Soliman, Omran, and Mahmoud (1991), Bassiouni, El Shammaa, and Baioumi (1992), El Shamma and Arafa (1992), El Shamma and Baioumi (1993), El Beialy (1994a, 1994b, 1994c), Ibrahim (1996), Schrank and Ibrahim (1995), Ibrahim and Schrank (1996), Schrank and Mahmoud (1998), El Shamma et al. (1999; 2001), Mahmoud and Moawad (1999; 2002), Mahmoud et al. (1999), El Beialy, Zalut, and Ali (2002), Ibrahim (2002a,b), Ibrahim, Dilcher, and Kholeif (2006a, 2006b), Lashin (2007), El Beialy et al. (2008), Zobaa, Obof-Ikuenobe, and Ibrahim (2011), Lashin and Ied (2013), Makled and Baioumi (2013), Makled, Baioumi, and Saleh (2013), Tahoun and Mohamed (2013), Tahoun, Makled, and Kholeif (2013); Tahoun, Makled, & Mostafa, 2013; Tahoun et al., 2015).	Abou Ela et al. (1989); Ibrahim, Aboul Ela, and Kholeif (1997, 2001; 2002), Ibrahim et al. (2007, 2008),	Kora and El Beialy (1989), El Sheikh and Aly (1994), Ibrahim and El Beialy (1995), El Beialy (1993).
Jurassic	Helal (1965, 1966), Saad (1978), Bassiouni, Ela, Abdelmalik, and El Shammaa (1981), Abdelmalik et al. (1981), Omran et al. (1989), Aboul Ela and Mahrous (1990), Mahmoud (1991), El Beialy (1994a), Mahmoud et al. (1999), Mahmoud and Moawad (2000), El Shamma, Obied, and Abu Saima (2001), Ied & Ibrahim (2010), Tahoun, Makled, and Kholeif (2013), Zobaa et al. (2013).	Ibrahim et al. (1997, 2001, 2002), El Shamma et al. (1997), Ibrahim et al. (2001), Ibrahim et al. (2007, 2008), Ied (2008).	Saad (1963), Sultan and Soliman (1978), Sultan (1985), Aboul Ela and Aly (1988), Shahin and El Beialy (1989), Abdel Mohsen (1990), Aboul Ela, Abdel Gawad and Saber (1990), El Sheikh and Aly (1994), Ibrahim and El Beialy (1995), El Beialy and Ibrahim (1997).

preparations under 400× magnification using a binocular Euromex microscope connected with Euromex color video camera model (VC 3031). Palynological slides and associated materials are stored in the Geology Department, Faculty of Science, Zagazig University, Egypt.

2. Stratigraphy

The subsurface stratigraphy of the north Eastern Desert is described by Norton (1967), Hassanein (1970), and Abd-Elshafy, Ibrahim, Nagwa (1987). Middle and Upper Jurassic to Lower

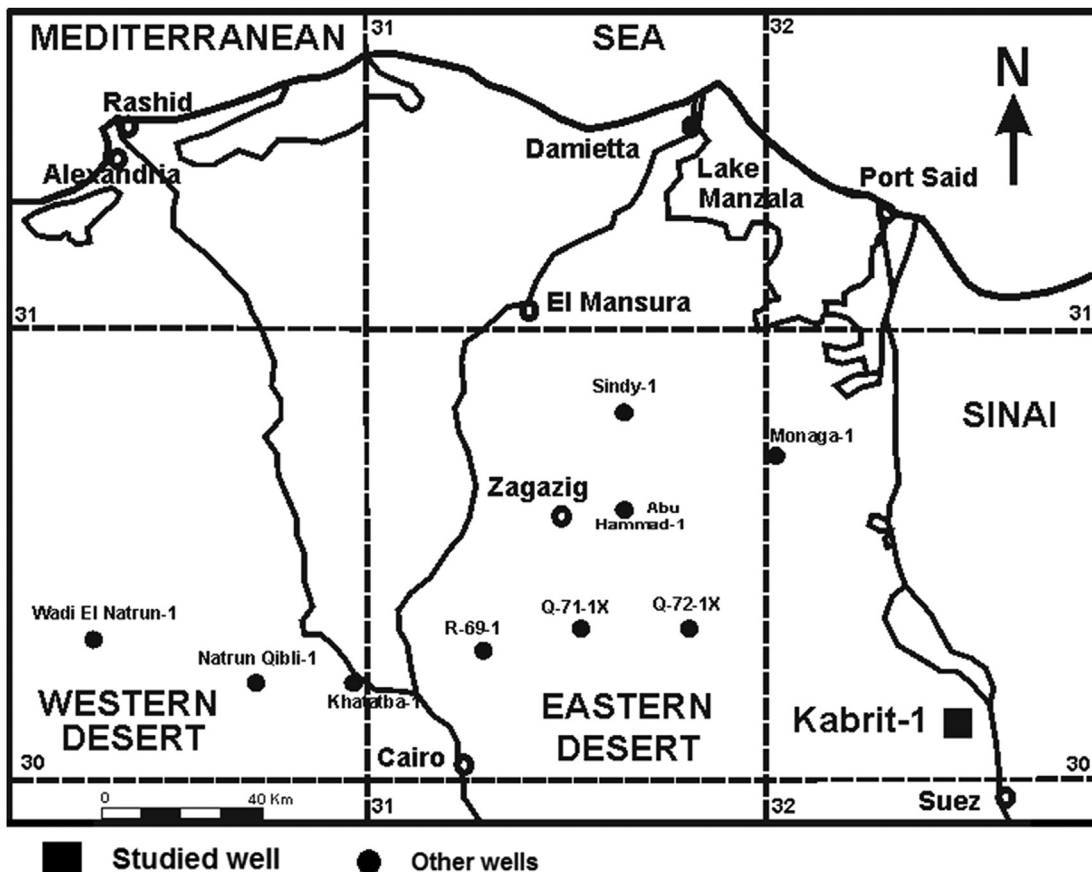


Fig. 1. Location map of the studied Kabrit-1 well (30°12' N, 32°29' E), north Eastern Desert, Egypt.

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