

Echinoids from the Galala Formation (Upper Cretaceous, Cenomanian) of the Ras Gharib-Sheikh Fadl road, Eastern Desert, Egypt



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ABSTRACT

Four regular and six irregular echinoid species are described from Cenomanian strata exposed about 85 km west of Ras Gharib along the road from El Sheikh Fadl to Ras Gharib, just north of the Eastern Desert. One of these, *Anorthopygus michelini*, is recorded for the first time from the Cretaceous of Egypt. The close resemblance between the present assemblage and coeval echinoid faunas from Nigeria and Niger is indicative of a marine connection between the western Tethyan Ocean and West Africa via what is now the Sahara Desert. The similarity of some Egyptian echinoid taxa to species recorded from northeast Brazil suggests a continued trans-Atlantic link during the Cenomanian.

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1. Introduction

The extent of Cretaceous strata in Egypt equals about 40 per cent of the country's surface area, and c. 15 per cent of the entire Eastern Desert. The latter extends from the eastern edge of the delta of the River Nile down into Sudan, between the Nile and the Red Sea. It measures 1100 km from north to south and, on average, 225 km from east to west, i.e., an area of over 222,000 square kilometres (Morrow and Morrow, 2002, p. 11). The Eastern Desert is dominated by the Red Sea Mountains, and between these and the Nile River valley there are extensive limestone and sandstone plateaus of Cretaceous and Eocene age. These are dissected by wadis and ravines which run east to the River Nile and west to the Red Sea. One of these wadis, Wadi Tarfa occupies about 80 per cent of the road between Ras Gharib and El Sheikh Fadl, which extends over a length of c. 250 km between the village of El Sheikh Fadl opposite to Beni Mazar on the eastern bank of the river. Pliocene–Recent deposits occur between Ras Gharib and the first basement outcrop at km mark 36. At km mark 68, the Nubian unconformity between the basement and the beginning of the Cretaceous is recorded. Marine Cretaceous strata occur at km mark 83, and the Cretaceous–Paleogene boundary has been noted at km mark 111, where Paleocene deposits crop out. Eocene levels are accessible at km mark 227 (Fig. 1).

2. Previous work

Generally, in Egypt echinoids are an important and conspicuous element in Cretaceous faunal assemblages; they are both abundant and diverse, particularly in Cenomanian strata. Studies of these echinoids, by foreign palaeontologists, started in 1899 by Fourtau. As of 1955 Egyptian palaeontologists began to study these echinoid fossils.

A summary of the previous works are giving in Table 1.

3. Stratigraphic setting

The study area (co-ordinates 32°23'61" N, 28°09'44"E) is located 85 km west of Ras Gharib, south of the road from Ras Gharib to El Sheikh Fadl (Figs. 1–2). The total thickness of the section exposed here attains about 55 m, 18 m of which correspond to the Cenomanian Galala Formation. This unit consists of fossiliferous limestones, marly and dolomitic limestones, with ammonites, nautiloids, oysters, gastropods and echinoids, and with intercalations of poorly fossiliferous to barren sandy shales. The echinoids described herein were collected from two levels, the lower one at 4 m above the base of the Galala Formation, the upper at 12 m above it.

The Galala Formation was introduced by Abdallah and El-Adindani (1963) for the northern and southern Galala Plateaus, to the west of the Gulf of Suez, i.e., the area situated to the north of the section studied here. According to those authors, the Galala

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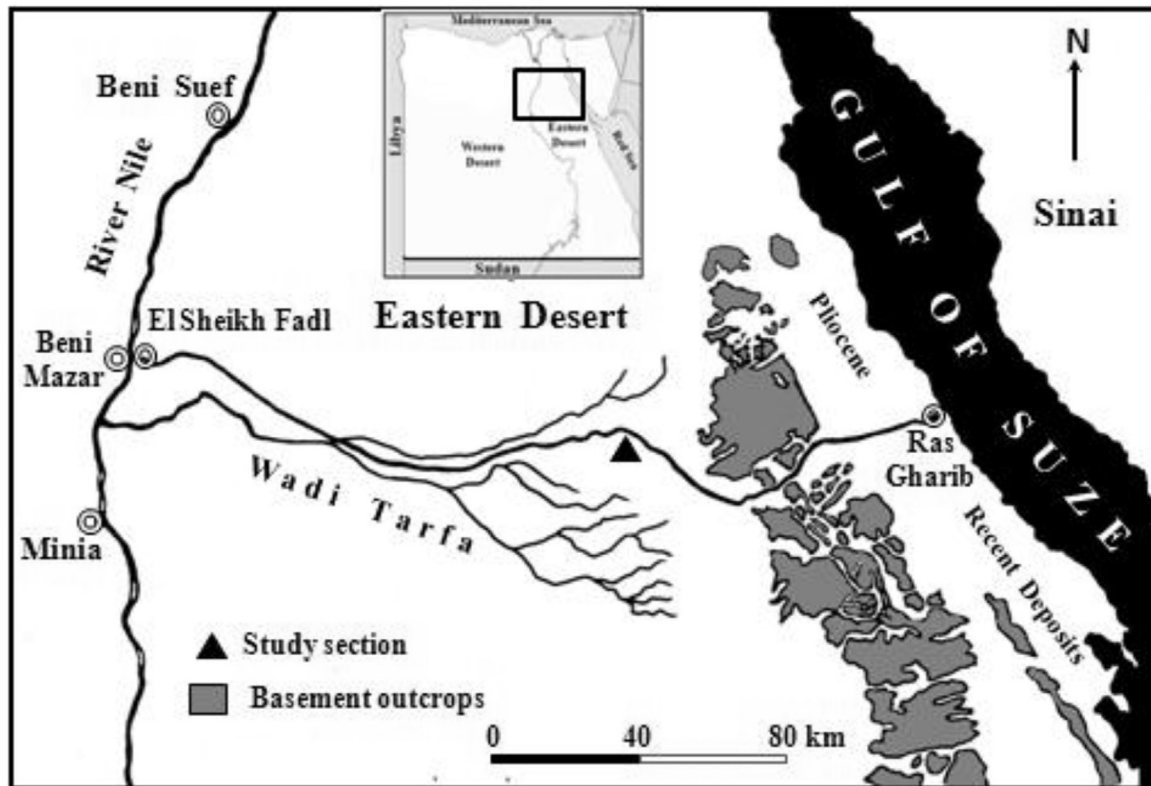


Fig. 1. Location map of the study section.

Formation is superposed on the Malha Formation of Early Cretaceous age. Much later, [Ismail et al. \(2009\)](#) divided the former unit, on the basis of foraminiferal assemblages, into two units. The lower clastic unit contains some species of arenaceous foraminifera of late Cenomanian date; the upper carbonate unit yields

several foraminiferal species that are of similar age. The Galala Formation is overlain by ammonite-bearing beds of the Maghra El Hadida Formation which were dated as Turonian by [Kassab \(1994\)](#). [Khalifa et al. \(2014\)](#) considered the Galala Formation to be of Cenomanian age at the sites of Gebel Shabraweet, Gebel

Table 1
Cretaceous echinoids of Egypt studied by different authors.

Author (s)	Year	Species recorded	Genera recorded	New species	New genera	Cenomanian species
Fourtau	1899	31	24	3	–	22
Fourtau	1900	10	7	5	–	2
Fourtau	1901	20	15	6	–	15
Fourtau	1904	4	1	3	–	4
Fourtau	1905	5	4	–	–	–
Fourtau	1906	5	4	3	1	2
Fourtau	1909	19	14	6	–	7
Fourtau	1912a	32	17	12	–	20
Fourtau	1913	2	2	2	–	–
Fourtau	1914	116	33	18 + 9	–	65
Fourtau	1921	119	46	43	1	37
Gregory	1906	27	11	7	1	20
Lambert	1932	35	21	4	–	8
Stefanini	1918	34	15	8	–	23
Mahmoud	1955	6	5	2	–	–
Fawzi	1959	4	4	–	–	4
Fawzi	1963	11	6	2	–	11
Geys	1989	5	5	2	–	4
Geys	1992	7	6	1	2	6
Abdel-Hamid	1995	83	30	6	–	38
Abdel-Hamid & Azab	2003	47	20	2	–	35
Abdel-Gawad et al.	2006	7	4	–	–	7
Abdel-Gawad et al.	2007	8	6	–	–	8
El Qot et al.	2009	26	16	–	–	13
El Qot	2010	30	20	1	–	20
Hannaa	2011	12	7	–	–	11
Abdel-Hamid & Azab	2012	30	14	2	–	–
Abdel-Hamid	2014a	23	12	2	–	23
Abdel-Hamid	2014b	3	1	1	–	3

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