

EOCENE BIVALVIA FROM SINAI

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TO MY MOTHER THE MOST
LOVELY, CHEERFUL AND
KINDNESS

MY LOVELY FATHER, HUSBAND
AND SON 'OMAR'

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ABSTRACT

Very few paleontological works deal with the systematic study of the Eocene Bivalvia of Sinai. In this work the Bivalvia collected from fifteen sections in west and central Sinai are systematically studied. These sections include one or more of the following rock units from base to top: Thebes Formation, Darat Formation, Khaboba Formation, Tanka Formation, Red Beds. Seventy-eight species are identified, systematically described and/or discussed, and illustrated. Of these, three are believed to be new, but have been provisionally placed in open nomenclature until adequate material is collected in the future. The studied bivalves came from six stratigraphic horizons: "*Cardita* Limestones" (lmk2; middle Eocene), Darat Mollusc Horizon (lmk3; middle Eocene), top part of the Tanka Formation (mmk4; upper Eocene) and three horizons in the Red Beds (mmk4, umk1, and umk2/3; upper Eocene).

Deep water conditions prevailed during the deposition of the lower and middle parts of the Thebes Formation. A quite uniform, relatively shallower environment, with mild bottom currents characterised the upper part of the Thebes Formation "*Cardita* Limestones". The shallowing conditions continued during the deposition of the Darat Formation. The southern part of the study area was relatively shallower than the northern part. Similar conditions appear to have prevailed during the deposition of the Khaboba and Tanka Formations. During the deposition of the Red Beds the environment became more shallower with high influx of fresh water supply.

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Chapter one

OBJECTIVES AND METHODS

Until recently, the systematic study of the Eocene Bivalvia of Sinai had not been done. Old works like those of Barron (1907), Ball (1916), Hume et al. (1920), Moon & Sadek (1923, 1925), Blanckenhorn (1921), and Farag & Shata (1957) included only lists of species without descriptions or illustrations. The great monographs of Oppenheim (1903-1906) and Cuvillier (1930, 1933, 1935) also lacked any information on the Eocene Bivalvia of Sinai. Abbass (1973), in his Monograph on the Paleocene and Eocene Bivalvia of Egypt, discussed only one species from the upper Eocene of west central Sinai, and, more recently, Strougo (1985) commented on the presence of three others in Sinai and the Nile Valley. To this day, only two paleontological works dealing with the Eocene Bivalvia of Sinai have been published. Strougo & Hamza (1989) identified 39 species in the upper Eocene Red Beds of Bir Haleifiya and systematically studied 15 of them. Lately, Strougo & Asan (2004) discussed 24 species from the lower part of the middle Eocene (lower Lutetian) of west central Sinai, six of which were considered to be new.

From the above, it clearly appears that the systematic study of the Eocene Bivalvia of Sinai needs much more work and effort than has been achieved so far.

The main objective of this thesis is to examine an abundant material collected from 15 sections covering different stratigraphic levels of the

Eocene rocks exposed in west and central Sinai (Fig. 1). Unfortunately, the lower Eocene proved to be extremely poor in bivalve species in these sections, while a profuse material was found in several successive levels in the middle and upper Eocene. In all, some one thousand and eight hundred bivalve specimens have been examined and systematically studied.

In order to present a comprehensive study of this fauna and its stratigraphic framework, several steps have been followed.

Chapter 2 summarizes the most important contributions that led to our present understanding of the stratigraphic setup of the Eocene succession of Sinai and its integration in a universal scheme based on reliable, age-diagnostic fossil groups as the planktic foraminifera, calcareous nannofossils and nummulites.

Chapter 3 contains an overview of the lithostratigraphic scheme that has been adopted, and the occurrences of the fossils in the different rock units. It ends with a discussion of the age of the various bivalve associations and their correlation with equivalent horizons in other parts of Egypt.

Chapter 4 is a historical overview of the main contributions to the systematic study of the Eocene Bivalvia of Egypt, summarizing our present knowledge of this important group. A Table attached at the end of this chapter illustrates all the species that have been introduced through the years by various authors, and their most probable taxonomic position according to recent revisions of these taxa.

Chapter 5 presents a systematic study of all the species that have been identified. It contains a full synonymy list, biometrical measurements (whenever feasible), number of specimens representing the taxon, formation name, age and locality. All the species have been illustrated. As some species showed a wide range of intraspecific variability, the author has tried to illustrate as many specimens as possible to usefully and meaningfully express this variation.

