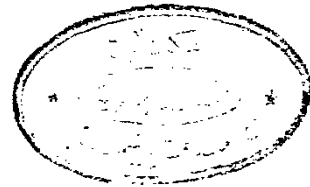


NUMMULITIDS OF THE EOCENE EXPOSURES IN THE GREATER CAIRO AREA

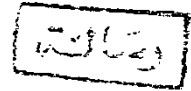
THESIS

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Of Master of Science
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By



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N O T E

The present thesis is submitted to the Faculty of Science, Ain Shams University in partial fulfillment for the requirements of Master of Science in Geology.

Besides the research work materialized in this thesis the author attended ten post graduate courses for one academic year in the following topics :

- 1- Field Geology and Geologic maps.
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CHAPTER I

INTRODUCTION

Nummulites are important rock forming elements in most of the Paleogene sediments of Egypt and of many other countries, especially those that once were covered by the Tethys ocean. It is not surprising therefore that, since the early days of geologic exploration the Nummulites have played a major role in dividing and characterizing successive levels in the Paleogene. Indeed, the nummulites, as a biostratigraphic tool, are to the Paleogene what the ammonites were to the Cretaceous, to the extent that RENEVIER had proposed in 1879 to replace the term Paleogene by that of Nummulitique. CUVILLIER seems to have adhered to this opinion, as his Ph.D. Thesis on the Paleogene of Egypt was entitled "Revision du Nummulitique Egyptien". He referred to the Lower Eocene as "Eonummulitique", the Middle Eocene "Mesonummulitique Inferieur" and the Upper Eocene "Mesonummulitique Superieur"; the Oligocene was designated as "Neonummulitique". However the profusion of the tests of nummulites in many rock sequences seems to have been an obstacle in the identification of various taxa; the great, sometimes excessive, variation within nummulite populations has posed many problems for the taxonomic discrimination of species and has frequently resulted in a great multiplication of species names. For example the two dimorphic forms of Nummulites species (A-

form or megalospheric, B-form or microspheric) had been treated for a long time as different species before the dimorphism of Nummulites was discovered. BOUSSAC (1911) has emphasized the lack of constant characters in nummulite populations and hence adopted some rules for the recognition of species. He expressed his opinion as follows "when we find a series of forms related together by all intermediates, living together in the same basin and even associated in the same sections, and occupying always the same stratigraphic level, these will be treated as one species; but if constant differences are noticed from one stratigraphic level to the other, we shall consider that we are dealing with two species. In one word, the species will be treated in a very wide sense in the horizontal direction and in a narrow sense, in the vertical direction". BOUSSAC also emphasized the procedure to be followed in order that the description and illustrations of nummulites be useful to the paleontologists and stratigraphers. His recommendations have been adopted by many subsequent authors, and are followed in the present work.

In Egypt the nummulites have been effectively used to divide the Paleocene and Eocene rocks since the early geologic exploration of the country . Thus ZITTEL was able to distinguish the Lybian Stage from the Mokattamian Stage by means of nummulites. The former yields at the base some of the oldest nummulites of the world : Nummulites deserti, Nummulites fraasi, Nummulites

solitarius. Higher up other nummulites appear : Nummulites subramondi and Nummulites praecursor near the top appears " N. obsoletus". The Mokattamian in turn, is characterized by the sudden disappearance of the previous forms and appearance of new ones belonging to the Nummulites gizehensis group. All these species were originally described from Egypt and have been subsequently reported from other countries as well. The history of scientific research on the Egyptian nummulites is therefore of old standing. Many papers are concerned with their systematic description, biostratigraphic potential and evolution. Unfortunately, a very many of these did not follow the procedure recommended by BOUSSAC, and we still read today names as N. contortus or N. contortus-striatus (the correct name is N. striatus) or N. curvispira (which is merely the A-form of N. gizehensis, the latter name being the valid one).

Speaking of N. gizehensis, it is worth recalling that it is one of the oldest species of nummulites described in the world. It is also probably one of the species which has received a great deal of attention by many workers, particularly during the past ten years or so. The numerous forms considered to be related in one way or another to this species have been treated in different ways by different authors. To some, they would be varieties; to others, races, subspecies or even separate species. The problem is still pending further research. In fact an important part of the present thesis is devoted to the study

of this problem. The theme "what is *Nummulites gizehensis*" is of primordial importance for the understanding of the presumed related forms. As a first step it was necessary to collect topotypes of *Nummulites gizehensis* and to study them in great detail. A further step was to collect forms attributed to this species from neighbouring areas in order to depict any possible lateral variation. Since the consensus seems to be that the plateau of the Pyramids of Giza is the type locality of *Nummulites gizehensis*, this area and Gebel Mokattam (which is the nearest outcrop in which *N. gizehensis* has been reported) have been selected for the study of their nummulites content, with special emphasis as already mentioned, on *Nummulites gizehensis*. Certain steps have to be followed to define nummulites species with precision. These steps come in the procedure followed to study these species, in the 2nd. rank after :

(1) Gathering samples for the study in stratigraphic order from sections at different places of the Greater Cairo area.

The first section lies at the Northern Scarp of the Giza Pyramids Plateau, the second section is from the Pyramids Plateau itself of Giza and it was collected from two sites, the first site is to the east of Khufu Pyramid, the second is from the cliff facing the Sphinx : The third section is taken from the Citadel site. The other two sections (Kait Bay section, El Basatin section) studied from Gebel Mokattam.

ii) Washing and crushing of the collected rock samples, then drying these friable residue . Finally, picking was started to study the two dimorphic forms, megalospheric (A-form), microspheric (B- form) of Nummulites species.

The steps followed to define nummulite species are :

I. Definition and description of the species under consideration. This was carried out by:

a) Recognizing the type of each species (holotype, lectotype, neotype).

b) Defining the place of the species in a given lineage.

c) Defining the stratigraphic position of the species with respect to a standard scale, which in our case is the scale proposed in 1981 by SCHAUB.

d) Describing the megalospheric (A — form) and the microspheric (B — form), forms of the species through the following steps :

- 1) shape of the test
- 2) shape of the surface septal filaments
- 3) position and mode of granulation if present
- 4) shape of the outer margin of the test
- 5) details of the equatorial section of the test including, shape of septa, regularity and thickness of the spiral cord, shape of chambers, number of whorls per radius
- 6) details of the axial section of the test,

mentioning the presence or absence of polar pustule , pillars and whether they extend to the surface or they are rudiments and occur only at the center of the test.

II. Figuration of the species through ;

(a) a large number of photographs so that each species is photographed from the dorsal side, equatorial section, axial section. Then these photographs are mounted on a plate producing a nearly uniform scale within each species, thus large nummulites appear large, small nummulites appear small.

(b) drawing of graphs indicating the space occupied by each species. Such diagrams are ;

- 1) spiral diagram and it is drawn after measuring radii occurring at each step of coiling for each species this is done for A_ and B_ forms using a suitable scale.
- 2) relation between the diameter and thickness in each species .

As a result of these graphs, the position of each species in the phyletic line could be checked by the reader.

A number of sketches in black for the septa for some species could be drawn; all these sketches must have the same scale to arrange the species in the phyletic series.