CHEMICAL AND MINERALOGICAL ASPECTS OF THE SOILS NORTH OF WADI EL-NATRUN AND THEIR BEARING ON GENESIS AND FORMATION

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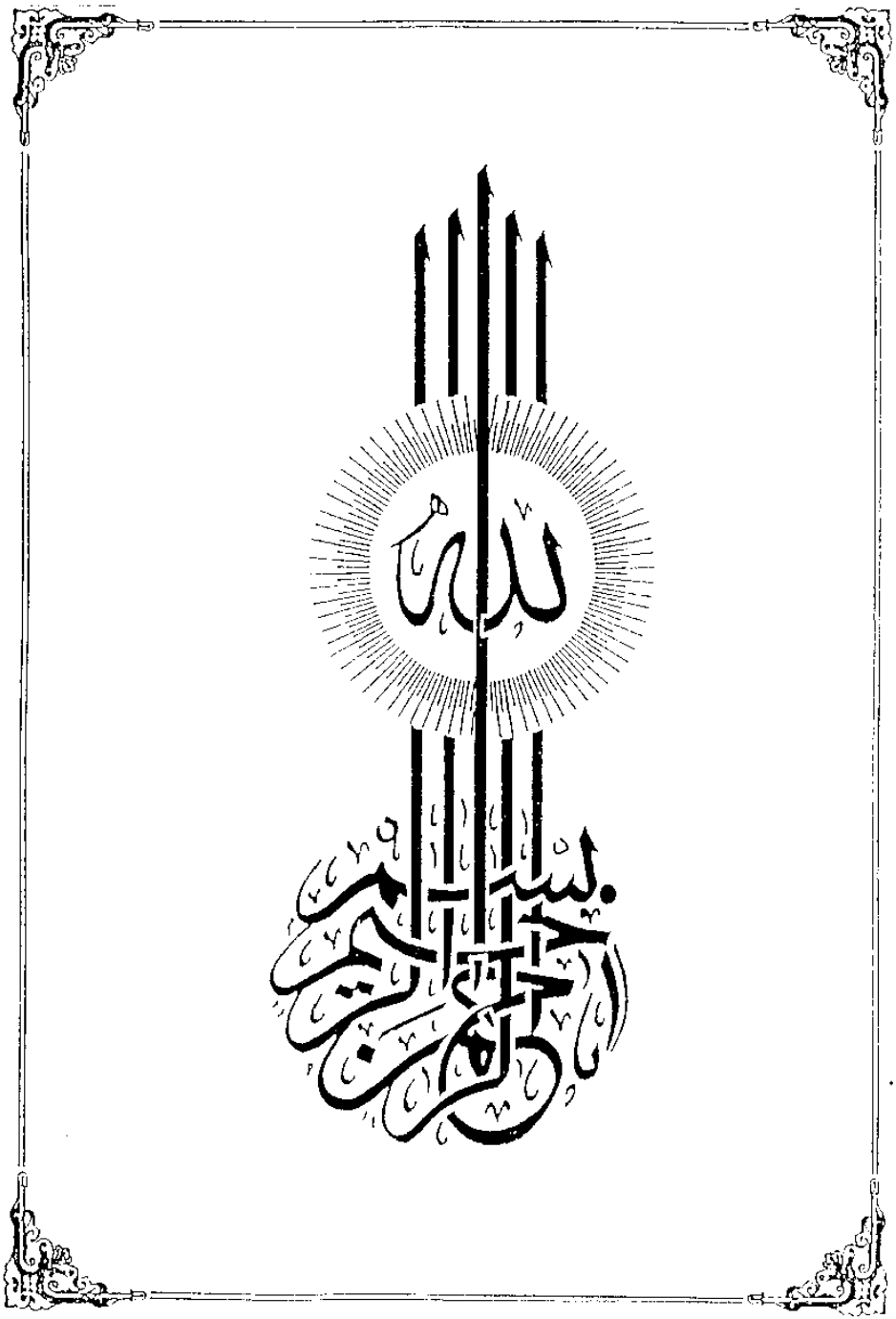

A C K N O W L E D G E M E N T

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CONTENTS

Cont.

I. INTRODUCTION

Great efforts have been extentend, by Governmental authorities and scientific organizations, toward increasing the arable land to meet the requirements of the over-expanding population. All available natural resources are wisely used for increasing the agriculture production and potentialities. The arable and reclaimed soils of the A.R.E. are alluvial, calcareous and sandy in nature. These soils occupy the northern lakes in the Delta region, the eastern and western fringes of the Delta and Nile Valley. Parts of the eastern and western deserts are also included.

The area North of Wadi El Natrun was selected for the current study as it is considered one of the important regions which is the subject of intensive studies by the scientific organizations as it is a center of numerous developmental activities. The chosen area constitute sediments related to different origins, different modes of formation and involved variable depositional environments. In addition, these sediments are developed under climatic conditions belonging to the semi-desert type. A reflection of such combinations is encountered when considering the physical, chemical and mineralogical aspects of the derived soils.

The current investigation is a trial to evaluate the chemical and mineralogical aspects of the chosen area. These aspects are expected to be influenced, to a great extent, by the different parent materials and their interferences. Besides, their bearing on soil genesis and formation is considered.

2. REVIEW OF LITERATURE

2.1. General

The studied area, North of Wadi El-Natrun, covers an area East and West of the main Cairo-Alex. desert road between km 128 and 175. It is intersected by Longitudes 29° 50' West and 30° 10' East and Latitudes 31° 00' North and 30° 30' South, Fig. No. (1). Natural boundaries are the northern portion of the Wadi El-Natrun on the South, while the Maryut district represents its northern boundary. On the East and West, it is bounded by El Nubaria Canal and Maryut tableland respectively.

Generally, the area is characterized by mild relief and its surface slopes gently in the NE direction at the rate of one m/km. In the SW part, its surface slopes rapidly into Wadi El-Natrun depression, where the ground elevation goes down almost to sea level. To the NW, the surface of the area rises into the Maryut tableland where the elevation up to contour line slightly exceeding 100 m above the present sea level. The central part of the area is occupied by El Tahrir gravelly plain associated with difference of relief, rarely exceeding 5 m. The area is

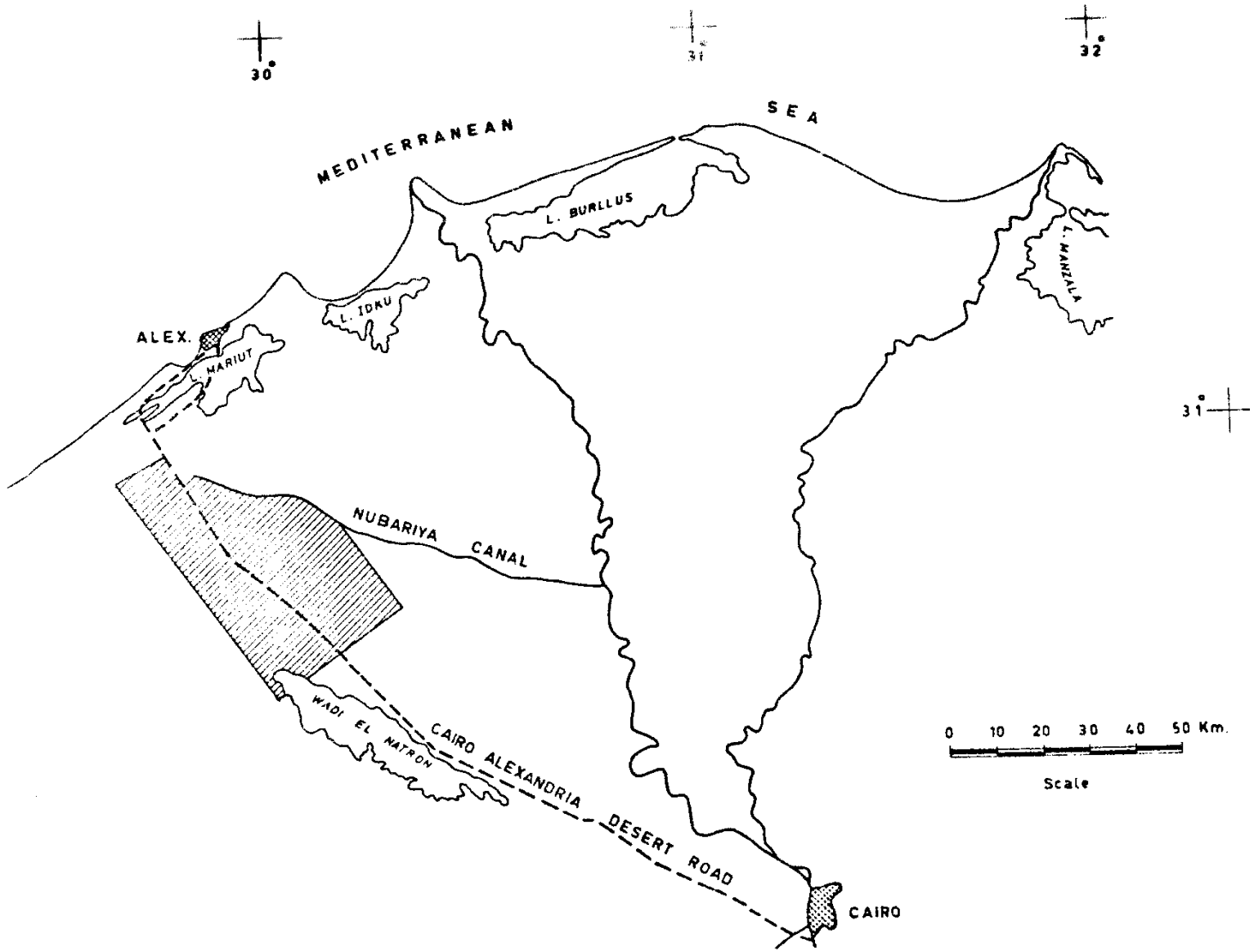


Fig. (1) LOCATION MAP OF THE INVESTIGATED AREA.

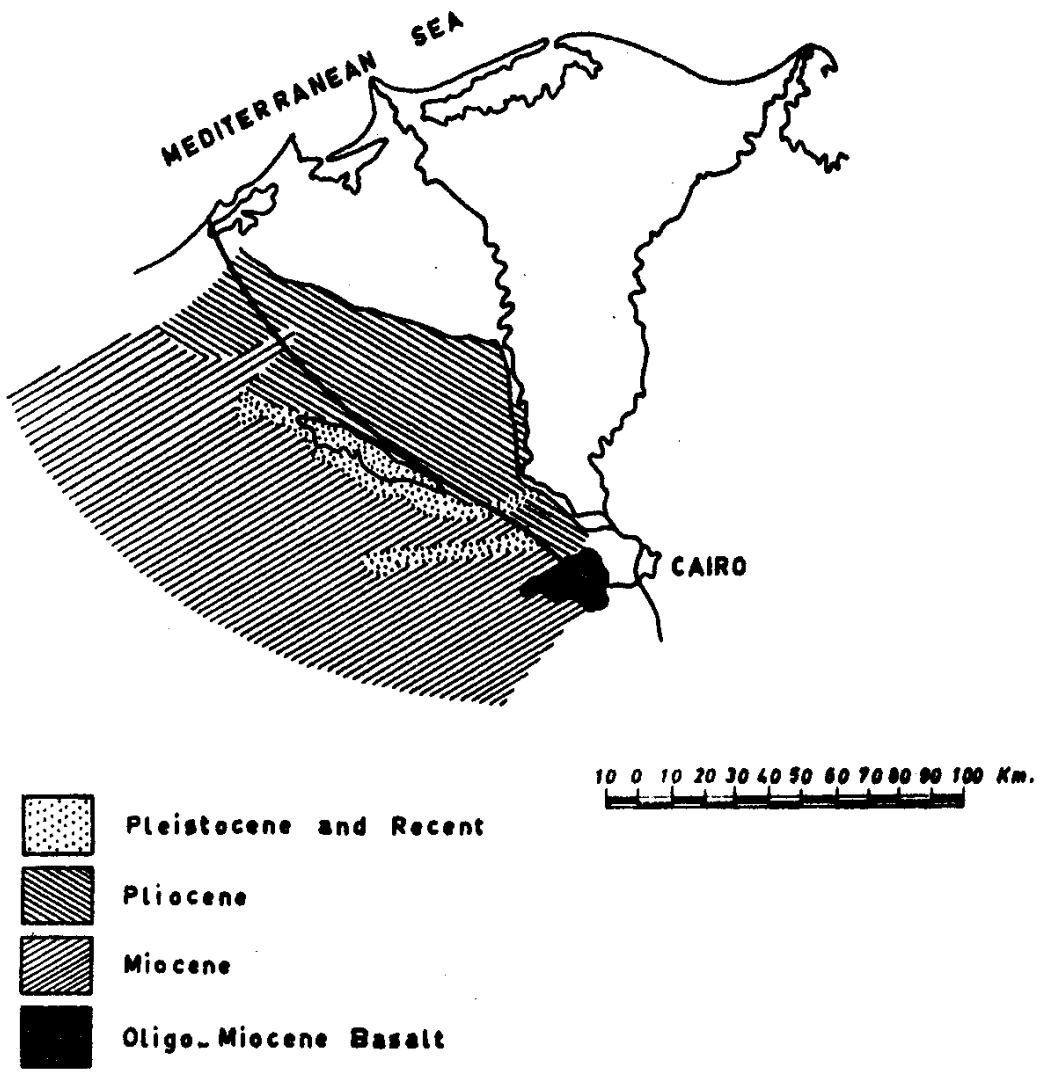
intersected by Wadis, the most prominent of which is Wadi Abu Mina. It traverses the Maryut tableland in a NE direction.

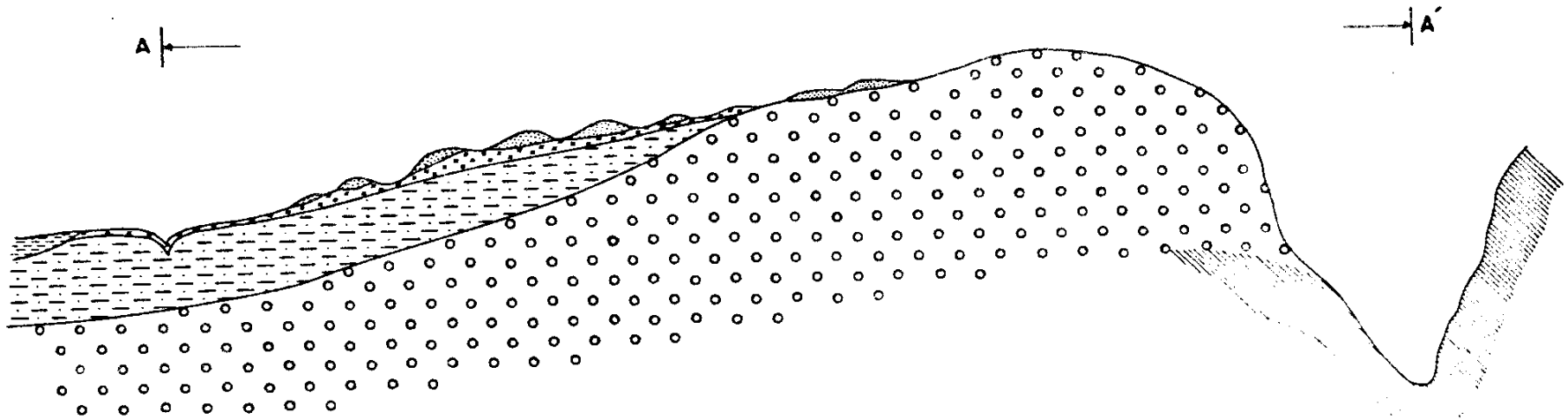
Four distinct deposits are dominantly in the area; namely, Aeolian deposits, Calcareous deposits, Fluviomarine deposits, and Nile deltaic deposits. Regarding the origin of such deposits Hume (1925), Sandford and Arkell (1939), La Moreaux (1962), Shata et al. (1962) and Shata and El Fayoumy (1967) reported that the aeolian sand deposits cover most of the area and are present in form of dunes, sand sheets and hummocks. The clacareous and the recent alluvial deposits are the characteristic features of the surface in the whole area. Underlying these the fluviomarine deposits are present, while Nile deltaic deposits occupy most of the area, exceptions are the depression and the surrounding terraces. The Nile deltaic deposits consist essentially of the following; the recent Nile silt deposits (cultivated land of the Nile and Delta), the young deltaic deposits which composed essentially of loose quartz sand, silt and gravels, and the old deltaic deposits which are formed of loose quartz sand and gravels with several streaks of grey sandy clay. Such deposits are rich in gypsum and rarely exposed in the area.

[illegible] of the area, North of Wadi El Natrun, is essentially occu-

Fig. (2) GEOLOGIC MAP OF THE NORTH OF WADI EL-NATRUN

(MODIFIED FROM SHATA BY LAMOREAUX 1962)





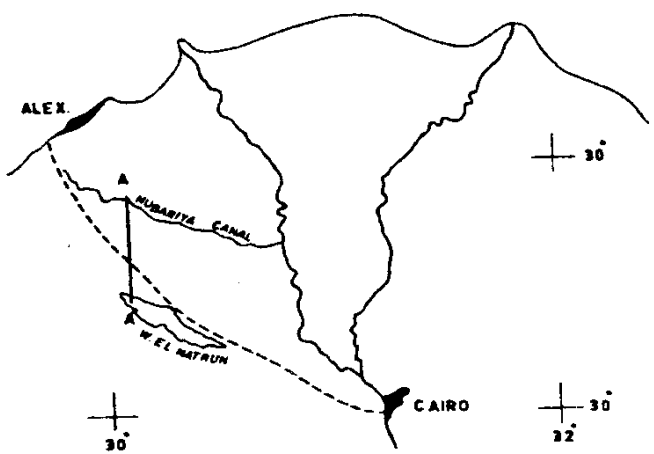


Fig.(3)

GEOLOGICAL CROSS SECTION BETWEEN WADI EL-NATRUN AND EL NUBARIYA CANAL

AFTER SHATA et al (1970)

0 1 2 3 4 5 Km.

Scale

- Nile Silt (Holocene)
- Aeolian Sand (Holocene)
- Calcareous loam (Holocene)
- Clay and Sandy Clay (Pleistocene)
- Sand and Gravels (Pleistocene)
- Clay and Sand with Sandy limestone beds (Pliocene)

and Pleistocene sediments represent thickness about 300 m, and increasing to the east towards the central portion of the main Nile Delta basin and decreasing to the West towards the edge of the Maryut tableland. They divide the Holocene and Pleistocene sediments into six main rock units as shown in the following:

Age	Rock Unit	Lithological Characteristic
Holocene	- Colluvial deposits	Hetrogeneous mixture of sand and clay; thickness variable (±1 m).
	- Crust formation	Indurated calcareous sandstone; thickness variable (± 1 m).
	- Aeolian deposits	Old sand dunes, hummocks and sheets; dominantly loose medium to coarse quartzitic sand; thickness varialbe (2 to 7 m).
	- Alluvial deposits	Calcareous sandy loam; thickness variable (2 to 8m).
Pleistocene.	- Fluviomarine deposits (Lagoonal deposits)	More than one lagoonal phase of clay and gypsum is separated by calcareous loam of alluvial origin; thickness variable (5 to 10 m).
	- Fluviatile deposits (Deltaic deposits)	Coarse gravel and sand; thickness variable (± 75 m) and increasing to more than 300 m towards the Delta.

The colluvial deposits, comprising all deposits that are either formed in situ or by the accumulation of weathered materials through gravitational movement. These form a thin mantle, never exeeding one meter thick, and are particularly noted in the interdunal swales. Such deposits are composed of a heterogeneous mixture of sand, silt and clay with variable amounts of calcareous materials depending on the characters inherited from the parent rocks. The crust formation, having a thickness not exceeding one meter, are essentially composed of grey indurated calcareous sand-stone with variable ratios of argillaceous material. The aeolian deposits, existing in forms of sand dunes or sand sheets; they run from East to West. The thickness of the dune deposits is 7 m particularly developed along the Cairo-Alex. road. Approaching Wadi El Natrun, however, the thickness of the dune sand deposits are much reduced. The constituent material, which built these dunes, are essentially derived from pre-existing Nilotic deposits which occupied much of the Delta and its fringes. The Alluvial deposits, covering about 10% of the area and are particularly noted in the western and north-western portions. These deposits, having a thickness of about 8 m and composed of calcareous sandy loam. With regard to the mode of origin, the alluvial deposits result from the depositional