_ FORMATION IN RELATION TO SEDIMENTATION IN THE LOWER NILE VALLEY

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I- INTRODUCTION

The alluvial soils of the Nile Valley and Delta is one of the principal natural resources in the U.A.R. They consist mainly of the Nile suspended matter, which has been deposited to a considerable thickness during thousands of years.

The chemical, physical and mineralogical properties of these soils, their formation and dynamic depend, to a great extent, on the petrographic and stratographic characteristics of these sediments.

The current investigation aims to study the soils and their formation in relation to sedimentation in the Lower part of the Nile Valley between Assiut and Aswan.

To fulfill this aim the soils of nine transects located on the flood plain in this region had been investigated. The study of these soils includes their morphological characteristics, chemical and physical properties, and the presence of some genetic horizons. In addition attention had been paid to their classification. A trial had been carried out to apply the 7th. approximation and its supplement (1967) as a natural system for the classification of these soils.

In the U.A.R. much attention is paid to increase production of the arable land to meet the needs of the rapidly growing population. The current study of these soils can also be considered as one of the essential requirements for any scheme of agriculture developing in this region.

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2- PHYSIOGRAPHIC FEATURES

2.1- Location.

Egypt is divided into two parts namely the Delta of the Nile which is called Lower Egypt and the area to the South which is called Upper Egypt. The area under investigation, lies approximately between latitudes 27° 11' and 24° 2' N. and longitude 31° 13' and 32° 53' E.(Fig.1). It covers the southern part of the Nile Valley which includes chiefly the governorates of Assiut, Sohag, Qena and Aswan and constitute about 1,246,000 feddans, only 1,114,000 of which are under cultivation at present. Downstream of cataract, which terminates just above the town north of Aswan, the valley in which the river flows, begins to broaden flat strips of cultivated land, gradually increase in width northward, extending between the river and the cliffs that bound its valley on either side :

Near Esna; about 160 kilometres downstream of Aswan (the sandstone of 120 kilometres downstream of Esna), the river makes great bend, and the limestone cliffs rise to heights of more than 300 metres on both sides.

Near Assuit, some 320 kilometres downstream of Esna, the cliffs on the western side of the valley become much lower than those on the east, and continue so far some 400 kilometres to Cairo, where the valley opens out to the Delta.

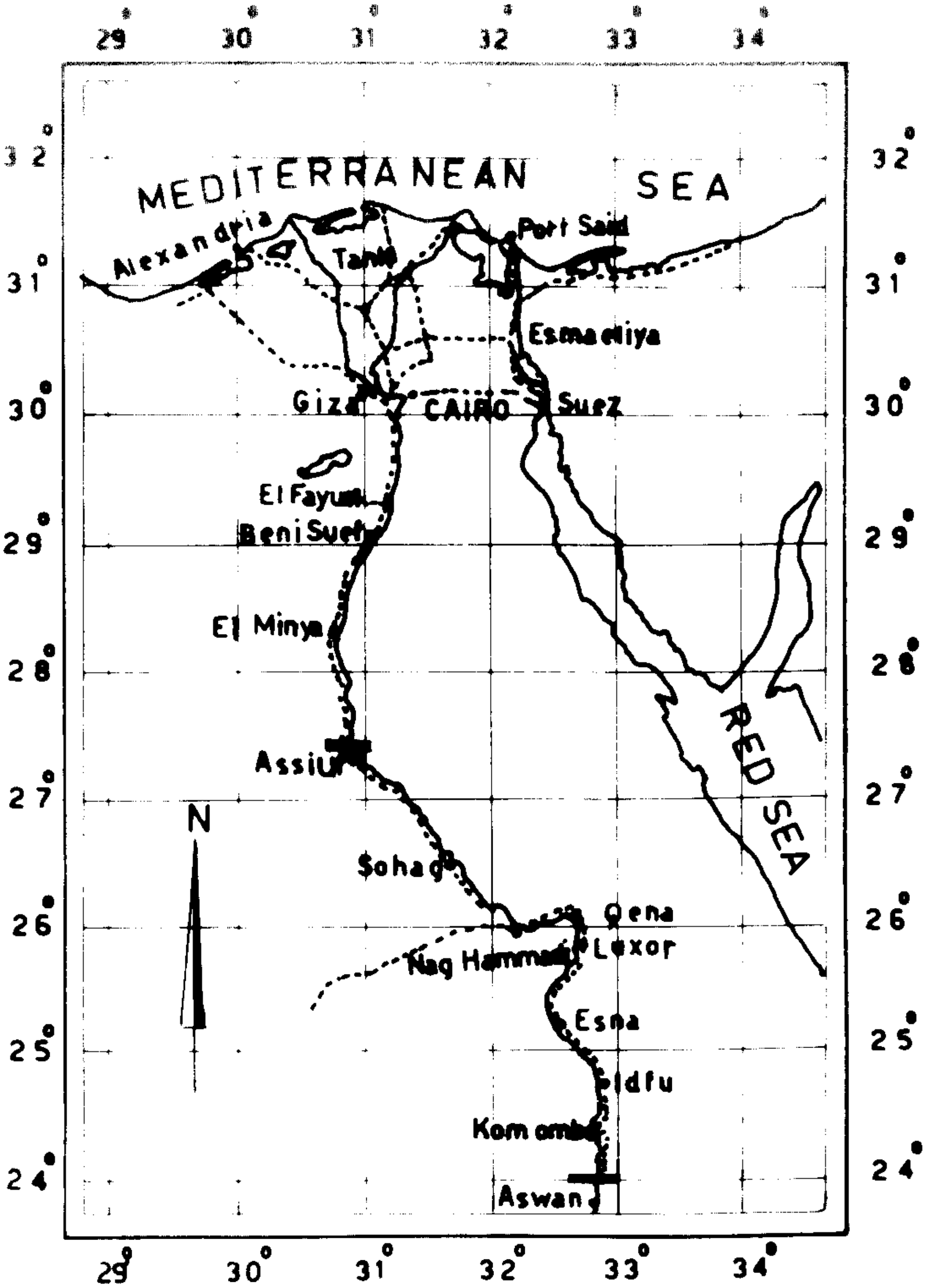

Fig.(1) LOCATION OF THE STUDIED AREAS IN THE LOWER NILE VALLEY (from Assiut to Aswan).

The width of the flat alluvial floor of the Nile valley between Aswan and Cairo, averages about ten kilo-metres (Ball, 1939). In this distance the river shows a marked tendency to occupy the eastern side of its valley, consequently the cultivable lands on the west of the river are in general, much wider than those on the east. In fact, in some places, the stream almost washes the feet of the east bounding cliffs. In many parts of the valley, marginal terraces of gravels containing flint implements can be traced at various heights above the present cultivation level, indicating that the river has flowed at higher levels in prehistoric times than it does at the present day.

Ball (1939) indicated that the levels of flood plain at the edge of the desert are 92, 76 and 51 metres above sea level at Aswan, Luxor and Assiut respectively. The average slope of the present flood plain are 1 m. in 12,700 metres from Aswan to Luxor and 1 m. in 11,000 metres from Nag Hammadi to Assiut.

The irrigation water is controlled by the construc-tion of barrages at many places across the river at Esna, Nag Hammadi and Assiut. Being merely for the purpose of raising the water-levels on their upstream sides, three or four metres, the barrages are less massive structures than the Aswan Dam, but like it they are furnishes with a sufficiency sluicescapable when fully opened of passing the full discharge of the river at flood-stage.

2.2- Geology and Geomorphology.

Ball (1939) reported that gravels and sands of pleistocene to recent age border the edge of the cultivatable lands in many parts of the Nile valley, where they form a series of terraces at various heights above the valley floor. The upper most part of the Nile valley floor and most of the surface of the Delta has been formed from the suspended matter carried by the flood-water of the river in the course of the recent geological period. The Nile mud, which constitutes the upper most part of the deposits, averages to 9 metres in thickness and is composed of very finely divided mineral material with which comparatively little admixture of sand. The particle size distribution and the chemical of the Nile suspended matter of the Nile water are represented in tables 1 and 2 (after Ball 1939). He added that these materials has probably all been laid down within the last 10,000 years or so, and the process is still slowly going on. Beneath this upper most accumulation of almost pure, Table (1) - The particle size distribution of the Nile suspended matter of the Nile water at Wadi Halfa and Cairo (after Ball, 1939).

	Coarse sand %	Fine sand %	Silt %	Clay %
Wadi Halfa, August to October 1930-31.	0	34	38	28
Cairo, August to October 1925-1926.	0.2	17.50	26.60	55.70
Difference	0.2	16.50	11.40	27.70

Table (2) - Chemical analysis of the suspended matter of the Nile at Cairo.

	Brazier 1850 %	Letheby 1874 %	Burns 1888-9 %	Lucas 1906 %	Mosséri 1925-27 %
Insoluble matter and silica	-	-	57.54	-	-
Silica	53.04	55.09	-	48.88	50.44
Ferric oxide	18.43			11.45	9.81
Alumina	8.76	20.92	25?56	20.58	19.01
Titanium dioxide	-	-	-		2.21
Manganese dioxide	-	-	0.25	n.d.	0.29
Lime	2.25	2.06	3.07	3.68	4.16
Magnesia	0.66	1.12	2.68	3.36	3.43
Potash	0.69	1.82	0.53	2.27	1.07
Soda	2.16	0.91	0.57	2.02	0.95
Sulphuric anhydride	-	-	-	0.07	0.39
Carbon dioxide	-	1.28	0.73	0.35	1.03
Phosphoric anhydride	-	1.78	0.25	0.25	0.24
Calcium carbonate	4.19	-	-	-	-

Nile mud there exists a considerable thickness of mixed sand and mud, deposited from the river during the transition-period between palœolithic and Neolithic times. Owing to the rising sea level, the Nile was aggrading its bed and raising the levels of its flood-plain in northern Egypt rapidly. In South Egypt, between Wadi Halfa and Nag-Hammadi, thick deposits of silts of late palœolithic (Early sebelian) age occur along the sides of the Nile Valley. They are found at heights of about 30 metres above the present day flood plain near Wadi Halfa and decreased northward to about 6 metres above the present-day flood-plain at Nag-Hammadi. These silts deposits are not entirely confined to the Nile valley but extend in some places for considerable distances into the deserts. They are frequently almost indistinguishable in character from the modern Nile mud but their greater antiquity is proved both by their stratigraphical relationships and by the flint implements that occur, They cover up the Lower gravel terraces of the Mousterian period, thus indicating that with the close of that period the Nile began to bring such immense quantities of silt into Egypt that the bed of the river to the north of the second, or Wadi Halfa, cataract become gradually raised by their accumulation. However, the downward erosion of the river was still going on in the northern part of Egypt so that the gradient of the river from Wadi Halfa northwards become for a time considerably steepened, and the silt material blocked the mouths of the eastern desert wadis in Upper Egypt in such a way as to indicate that desert conditions had set in the southern part of Egypt by the end of the Middle palaeolithic period.

Said (1962), noticed the following succession of rocks along the stretch of the valley between Aswan and Cairo. Maps 2 and 3 show the geology of Egypt and Nile Valley from Aswan to Qena (after Said). At Aswan the Nubians sand-stone overlying the peneplained igneous and metamorphic rocks. As short distance to north of Aswan the igneous rocks do not show above ground and from the northward to Darau the Nile valley is bounded by Nubian sandstone hills on the east side and an undulating sandstone desert on the west side. These hills extend until Silwa.

From Silwa to Idfu, the Nubian sandstones and shales are capped by shelly limestones and bone beds. The river running eastward through this district, cut its valley through the softer shales leaving spures of the harder beds abutting on the cultivated land. On both sides of the Nile, in the Sebaiya district, the phosphate beds occur immediately below the alluvium covering the surface of the plain which extends between the cultivated land and the