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PEDOLOGICAL STUDIES ON SOME SOILS REPRESENTING DIFFERENT GEOMORPHIC UNITS BASED ON THE MINERALOGICAL COMPOSITION OF THE FINE SAND FRACTION.

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ABSTRACT

In order to indicate the origin and uniformity of the soil forming substratum of some different geomorphological unit of Egypt based on the mineralogy of the fine sand fraction (250-63μm), sixteen profiles were selected. These profiles represent soils of the alluvial deposits of the Nile Delta (Qalubeya) and valley (Qena), swamps (El-Manzala) and fluvio-marine-lacustine deposits (El-Manzala), beach Sands (Idku), calcareous sediments (Western desert). Aeolian sandy sediments of river terraces(at south of the wadi El-Natrun) and Oases depressions (El-Kharga, El-Dakhla and El-Baharia) .

Heavy mineral were separated and subjected to petro-graphical study.

Mineralogical compositions of the heavy minerals are detected as opaques, pyroxenes, amphiboles and epidote in pronounced amounts. zircon, tourmaline, rutile, chlorite and staurolite are presented in relatively moderate amounts, while the remaining minerals are found in less pronounced amounts.

The relative frequencies of the detected minerals either as percentages or as ratios between resistant minerals and even as weathering ratios were discussed in terms of pedogenesis and profiles uniformity.

The soils under consideration differ very greatly in their mineralogical properties as well as in mode of formation as they differ in origin and age.

Evidences for the contamination of the highly calcareous sediments with Nile alluvium and also indications of volcanic activity are given.

Key wards: Heavy minerals, resistant minerals and fine sandy

Heavy minerals analysis can be used to establish soil origin and to discriminate between the different depositional environments, Jackson and Sherman (1953), Brewer (1960) and Barshad (1964), According to Pattijohn (1969), the heavy mineral assemblage reflects the combination effect of many factors; these factors are the rock source agent of transporation, environments of deposition and the extent of Post-depositional changes. Heavy minerals have been used by soil scientists for evaluating the uniformity of parent material and profiles development.

Therefore, the current study is an attempt for identifying the type, suite and distribution of heavy minerals in the sand fraction in order to elucidate the origin, uniformity and development of some soils representing the Geomorphic Units of Egypt.

Several trial were undertaken to evaluate profile uniformity and development of some soils of Egypt (Labib and Hamdi, 1972; Abdel Salam *et al.*, 1975; Abdel-Aal *et al.*, 1977; Elwan *et al.*, 1980; Kassim and Abd El-Rahman, 1981 & Gewaifel *et al.*, 1981). These authors studies soils of different origin and tried to evaluate their mode of formation and factors affecting their depositional regime based on different Parameters.

Despite these investigations, lack of information concerning comparison between these soils is felt. Also, some or these studies are contradictory.

MATERIALS AND METHODS

Forty eight soil samples were collected from twenty two soil profiles representing the main geomorphological unit of Egypt. Profile locations are shown in Fig. 1. these features are:

i. The alluvial deposits of the Nile Delta were represented by profile No. 1.
ii. The alluvial deposits of the Nile valley were represented by profile No. 2.
iii. Fluvio-marine-lacustrine deposits of El-Manzala Lake were represented by profile No. 3.
iv. Swamp soils in the deposits of El-Manzala Lake, were represented by profile No. 4.
v. Profiles No. 5 and 6 (North of the Wadi El-Natrun): represent soils of the calcareous deposits (vally).
vi. The beach sandy sediments of south Idku were represented by profile No. 7.
vii. Oases depressions were represented by profile No. 8 and 9 (at El-Dakhla), No. 10, 11 and 12 (at El-Kharga) and No. 13 and 14 (at El-El-Baharia).
viii. The Aeolian sandy sediments of the old terraces of the river Nile, were represented by profile No. 15 and 16 (at south of the Wadi El-Natrun).

The profiles were morphological described according to Soil Survey Staff (1990). The soil sample were air-dried, ground and passed through a 2 mm sieve. After the ordinary pretreatments (Jackson 1973) the fine sand fraction (250-63µm) was separated from each sample by dry sieving, cleaned up and further differentiated from each sample dry sieving bromoform (SP Gr.2.85 ± 0.02). The heavy minerals were mounted on slide in canada balsam for identification (Brewer, 1964). The relative frequencies of the minerals were determined by counting about 500 grains from each sample by the polarizing microscope, using a gradual mechanical stage for counting. Identification of minerals was under taken according to the procedure of Milner (1962).

RESULTS AND DISCUSSION

The frequency distribution of heavy minerals in the fine sand fraction (250-63µm) is shown in Table .1. and Fig. 2. the non-opaque constant as 100%, however the opaque percentages are also recorded. From the Table, the general characteristics of heavy mineral composition can be summarized as follows:

Opaque minerals together with the non-opaques minerals; pyroxenes; amphiboles and epidotes are the abundant. The association of pyroxenes, amphiboles and epidotes constitutes including garnet, staurolite, kyanite, sillimanite, andalusite, glauconite and monazite are found in less pronounced amounts.

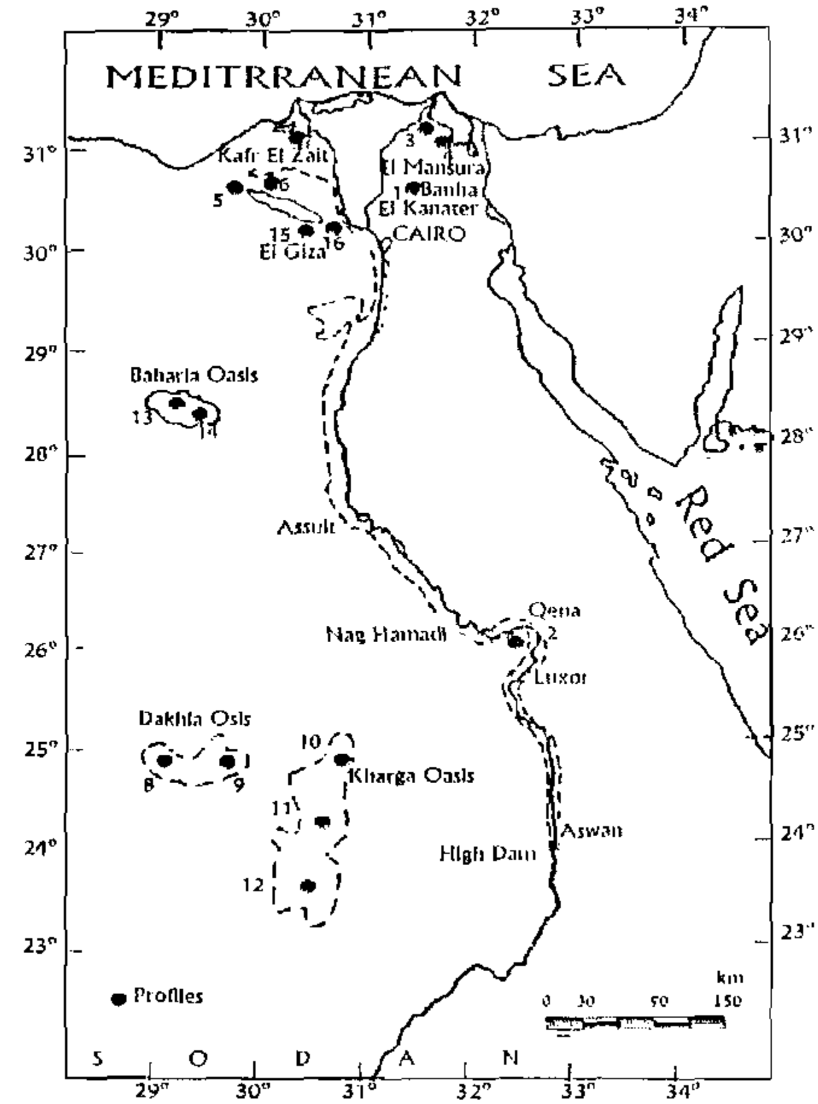

Fig. 1 Location map of the soil profiles.

Table 1: Frequency distribution of heavy minerals of the studied soil profiles.

Geomor-Phic Units	Prof. No.	Depth (cm)	Opaq-ues %	Pyrox-ene %	Ampfi-boles %	Epid-ote %	Zircon %	Rutile %	Tour-maline %	Garnet %	Kya-nite %	Silim-anite %	Anda-lusite %	Glauc-onite %	Mona-zite %	Biotite %	Apa-tite %	Stau-rolite %	Chlor-ite %	Oth-ers %
Alluvial deposits	1 Delta	0-25	36.2	27.5	30.5	30.3	1.7	1.4	1.1	1.2	1.1	–	–	–	–	1.6	0.5	1.2	1.9	–
		25-80	34.3	26.1	30.5	31.5	1.6	1.2	1.1	1.0	–	–	–	–	1.1	1.7	0.3	1.7	1.8	–
		80-120	35.4	25.2	32.5	31.5	1.3	1.1	1.2	1.4	–	–	–	–	–	1.2	–	1.2	1.7	–
	2 Vally	0-30	39.2	28.3	29.0	30.5	1.6	1.2	1.0	1.6	1.2	–	–	–	1.2	1.1	0.8	1.2	1.1	–
		30-80	38.4	27.2	30.0	31.5	1.5	1.5	0.5	1.5	1.2	–	–	–	–	1.1	–	1.1	1.1	–
		80-150	36.3	26.6	31.5	32.9	1.4	1.0	0.5	1.1	–	–	–	–	–	1.1	–	1.1	1.1	–
Lacust-rine deposits	3	0-10	36.7	14.2	23.5	8.5	6.0	5.5	6.0	2.5	–	2.1	0.8	–	–	2.2	3.5	12.0	12.5	–
		10-30	30.3	21.0	29.0	8.5	5.0	3.5	5.5	1.5	–	2.1	0.8	–	–	2.2	2.6	10.0	6.5	–
		30-60	46.5	28.0	20.0	4.4	6.0	1.5	5.8	3.0	–	3.1	–	–	–	0.5	2.6	8.0	16.0	–
	4 Fluvio marine	0-15	38.2	20.0	22.0	10.0	7.0	0.3	2.5	0.5	–	–	–	–	–	13.2	–	9.5	11.0	–
		15-40	45.4	21.0	23.0	6.0	6.0	0.3	2.5	4.9	2.5	–	–	–	–	9.2	–	6.5	14.0	–
		40-70	41.6	17.0	21.5	4.3	8.3	5.5	2.5	2.0	–	–	–	–	–	17.2	0.4	4.5	15.0	–
Calca-reous sedim-ents	5 Vally	0-40	69.3	14.0	11.5	8.5	35.5	4.2	3.5	1.9	4.2	0.5	–	0.9	–	5.6	1.9	3.8	–	2.6
		40-90	65.2	13.0	11.5	9.8	35.0	9.2	3.4	2.6	1.5	0.8	–	0.3	–	2.8	0.8	4.1	–	0.8
		90-150	67.6	13.0	13.0	11.8	32.0	5.6	2.6	2.9	1.0	–	–	0.4	–	0.9	0.3	4.6	–	2.1
	6 Plain	0-30	86.1	26.5	14.4	11.0	20.2	20.0	1.5	1.5	–	–	–	–	–	1.5	–	3.4	–	–
		30-80	75.3	27.0	9.3	14.5	27.3	5.5	6.2	0.9	–	–	–	–	–	1 9	–	1.0	–	–
		80-150	76.4	17.0	19.0	14.5	37.5	4.0	1.7	0.5	–	–	–	–	–	0.9	0.5	0.8	–	–

Table 1: Frequency distribution of heavy minerals of the studied soil profiles (cont.).

Geomor-Phic Units	Prof. No.	Depth (cm)	Opaq-ues %	Pyrox-ene %	Ampfi-boles %	Epid-ote %	Zircon %	Rutile %	Tour-maline %	Garnet %	Kya-nite %	Silim-anite %	Anda-lusite %	Glauc-onite %	Mona-zite %	Biotite %	Apa-tite %	Stau-rolite %	Chlor-ite %	Oth-ers %
Beach deposits	7	0-20	33.2	19.0	25.5	19.0	4.0	1.2	2.0	0.5	–	–	–	–	–	5.0	0.8	9.0	11.0	–
		20-50	27.1	19.0	17.3	15.0	4.5	–	1.5	2.5	–	–	–	–	1.2	6.0	0.9	7.0	20.0	–
		50-80	20.2	13.0	28.0	15.2	5.1	1.0	2.0	0.3	–	–	–	–	1.1	4.0	1.0	11.0	15.0	–
Oases	8 Dakhla	0-30	89.3	13.0	3.2	10.5	39.5	8.0	4.0	0.5	–	–	–	–	–	–	–	20.2	–	–
		30-55	93.8	12.0	7.8	61.0	3.2	–	7.0	–	–	–	–	–	–	–	0.3	7.0	–	–
		55-90	89.1	12.0	5.5	12.0	19.5	17.0	4.0	–	0.5	–	–	–	–	–	–	25.5	–	–
	9 Dakhla	0-25	87.2	14.0	2.5	12.0	40.5	8.5	3.5	–	–	–	–	–	–	–	–	18.0	–	–
		25-60	90.3	12.0	8.2	59.5	3.3	0.5	6.5	0.5	–	–	–	–	–	–	–	8.0	–	–
		60-100	92.2	13.0	5.3	11.5	18.5	16.5	3.5	–	–	–	–	–	–	–	–	24.5	–	–
	10 Kharga	0-25	81.1	7.5	6.0	30.5	11.5	4.0	3.5	–	–	–	–	–	–	–	–	28.0	–	–
		25-70	93.2	12.5	5.0	50.0	21.0	6.2	–	0.4	0.3	–	–	–	–	–	0.2	8.0	–	–
		70-90	83.4	13.0	6.5	12.0	45.5	12.0	4.5	–	–	–	–	–	–	–	–	3.6	–	–
	11 Kharga	0-25	80.4	8.0	5.5	29.0	13.0	4.5	2.9	–	–	–	–	–	–	–	–	25.5	–	–
		25-65	91.3	14.0	3.5	50.6	20.5	5.5	–	–	–	–	–	–	–	0.5	–	10.0	–	–
		65-100	81.6	14.0	6.5	14.5	45.0	12.2	3.9	–	–	–	–	–	–	–	0.3	3.2	–	–
	12 Kharga	0-30	81.1	7.0	6.3	28.5	12.5	4.0	3.5	–	–	–	–	–	–	–	–	26.0	–	–
		30-70	93.2	13.5	4.2	51.5	21.5	5.0	–	0.5	–	–	–	–	–	–	–	9.5	–	–
		70-100	80.2	14.0	7.0	14.0	44.5	11.1	4.2	–	0.5	–	–	–	–	0.2	0.4	4.0	–	–

Table 1: Frequency distribution of heavy minerals of the studied soil profiles (cont.).

Geomor-Phic Units	Prof. No.	Depth (cm)	Opaq-ues %	Pyrox-ene %	Ampfi-boles %	Epid-ote %	Zircon %	Rutile %	Tour-maline %	Garnet %	Kya-nite %	Silim-anite %	Anda-lusite %	Glauc-onite %	Mona-zite %	Biotite %	Apa-tite %	Stau-rolite %	Chlor-ite %	Oth-ers %
Depre-ssion	13 Baharia	0-8	93.1	22.0	9.0	22.5	22.5	4.2	1.6	-	-	-	-	-	-	-	-	18.0	-	-
		8-40	95.2	14.0	8.2	37.4	20.5	8.9	1.8	-	-	-	-	-	-	1.1	-	8.0	-	-
		40-80	87.3	19.0	6.1	27.5	19.5	6.5	4.8	6.5	-	-	-	-	-	0.6	-	9.0	-	-
	14 Baharia	0-7	91.4	22.3	9.5	23.2	21.0	4.5	1.5	-	-	-	-	-	-	0.5	-	17.0	-	-
		7-35	94.2	15.0	8.4	36.3	21.0	7.3	2.1	-	-	-	-	-	-	-	0.3	9.5	-	-
		35-85	88.1	17.5	5.5	25.5	19.3	6.9	5.0	6.7	-	-	-	-	-	1.0	-	10.5	-	-
Aeolian sand	15	0-30	91.3	20.0	4.2	10.0	24.0	13.5	0.9	5.6	4.9	-	1.6	3.6	-	2.8	-	1.5	-	6.1
		30-60	60.2	22.0	4.0	11.0	34.0	7.4	4.6	3.5	3.0	-	-	0.8	-	0.9	0.4	5.5	-	4.2
		60-150	57.1	13.0	6.0	17.0	29.0	4.5	3.9	4.5	2.5	-	-	3.9	-	2.4	0.4	7.9	-	4.6
	16	0-20	63.2	21.0	5.1	10.5	23.0	12.5	0.6	4.9	4.8	-	1.4	2.9	-	2.7	-	1.4	-	5.9
		20-70	61.4	23.0	4.7	12.0	31.0	7.9	3.8	2.8	2.9	-	-	0.8	-	0.7	0.2	5.1	-	3.2
		70-150	59.2	14.5	7.0	18.0	28.0	5.9	3.1	3.8	2.4	-	-	3.2	-	2.5	0.2	7.4	-	3.6

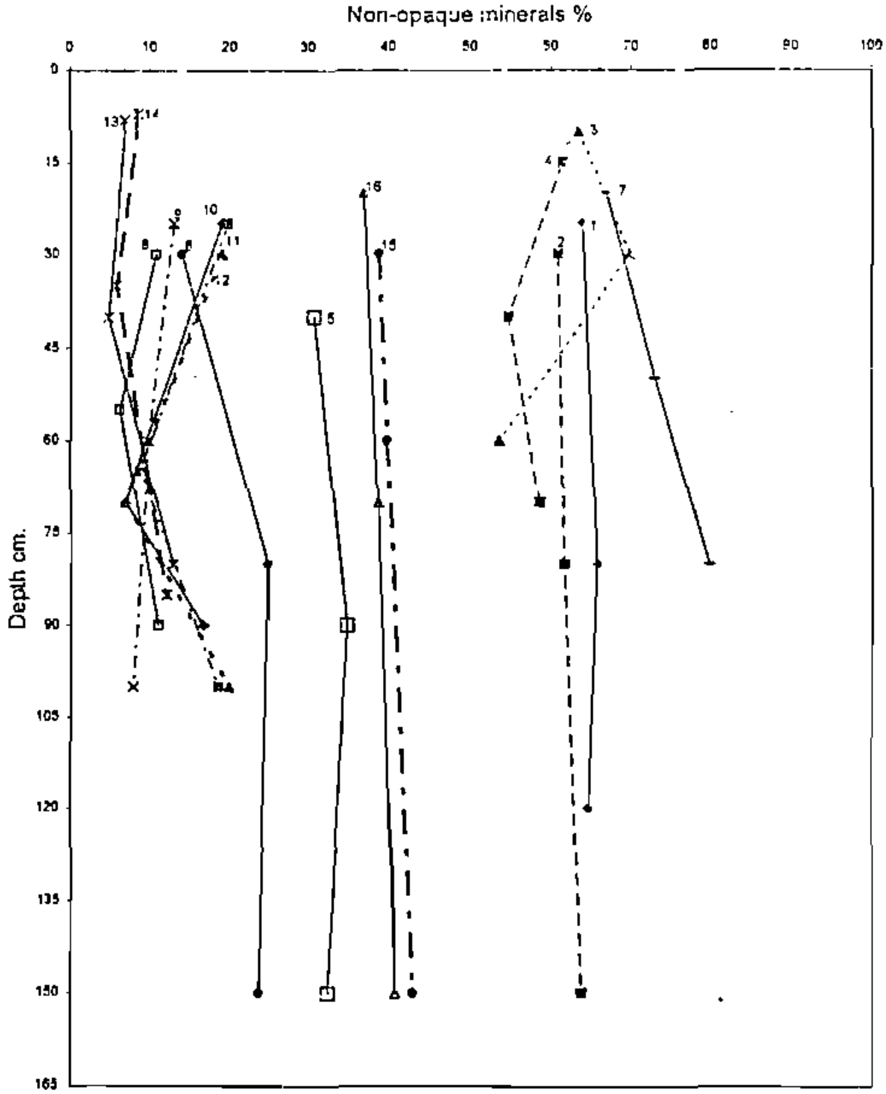

Fig. 2. Distribution in depth of non-opaque minerals in the soil profiles

Opaques form a considerable part of the heavy minerals in all the examined samples, and their opaque values very in a widely range among the different geomorphic units.

Non – Opaque minerals:

The non-opaque minerals (Table .1. and Fig. 2.) show distinctly the variation among the investigated soils they differ in origin and age. Alluvial soils of the Nile Delta and valley (profiles 1 and 2), lacustrine sediments (profiles 3 and 4), and beach deposits (profile 7) contain the highest percentages of the non-opaques (54.6 – 79.8). Soil of the Aeolian sandy deposition of the old terraces of Nile river (Pleistocene age) come next with a range of 36.8 – 42.9%.

The highly calcareous soils of the Wadi El-Natrun (profiles 5 and 6) have only values between 13.9 and 34.8%.

Regarding soils of the Oases (profiles 8, 9, 10, 11, 12, 13 and 14), the percentages of of the non-opaques range between 4.8 and 19.8%.

Resistant minerals:

Quantities as well as horizontal and vertical distribution of the resistant minerals (zircon, tourmaline and rutile) are used as indices of parent material, soil relative age and degree of soil development and formation. Transported or stratified formation may be identified through the distribution depth of the resistant minerals.

Fig. 3. presents the percentage distribution of the sum of these three resistant minerals along the soil depth for the considered profiles.

It is obvious that the soils of the Nile Delta and Valley (profiles 1 and 2) and beach sandy sediments of South Idku lake (profile 7) contain the lowest percentage (less than 7.5%), while it raised to about 11.6-15% in the soils of flavio-marine-lacusrine deposits of lake El-Manzala (profile 3) and Swamp soils in the deposits of El-Manzala lake (profile 4). The similar content of resistant minerals of Nile alluvium and beach sands confirms that they have been derived from the volcanic Abessynia plateau, as well as from acidic igneous rocks of southern Sudan (Shukri, 1950).

The Aeolian sandy sediment of the old terraces of the river Nile (profiles 15 and 16) have high contents of resistant minerals (36.1-46%) which stay mostly constant with depth.

The calcareous soils of the Western Desert,north of the Wadi El-Natrun (profiles 5 and 6) contain more than 39% of resistant minerals in ally layers. This might be taken as an indication for the similarity of both formations.

With regard to the soils ofOases, they show different patterns in their content and distribution of resistant minerals. Soils of El-Dakhla Oasis (profiles 8 and 9) have 52.5% of resistant minerals in the surface layer; there is a sharp decrease to 10.2% in the subsurface and on increase to 38.5% in the deepest layer. El-Kharga Oases soils (profiles 10, 11, and 12) have 19% of resistant minerals in the surface layer increasing slightly in subsoil to 27.3% and sharply to about 62% in the deepest layer.

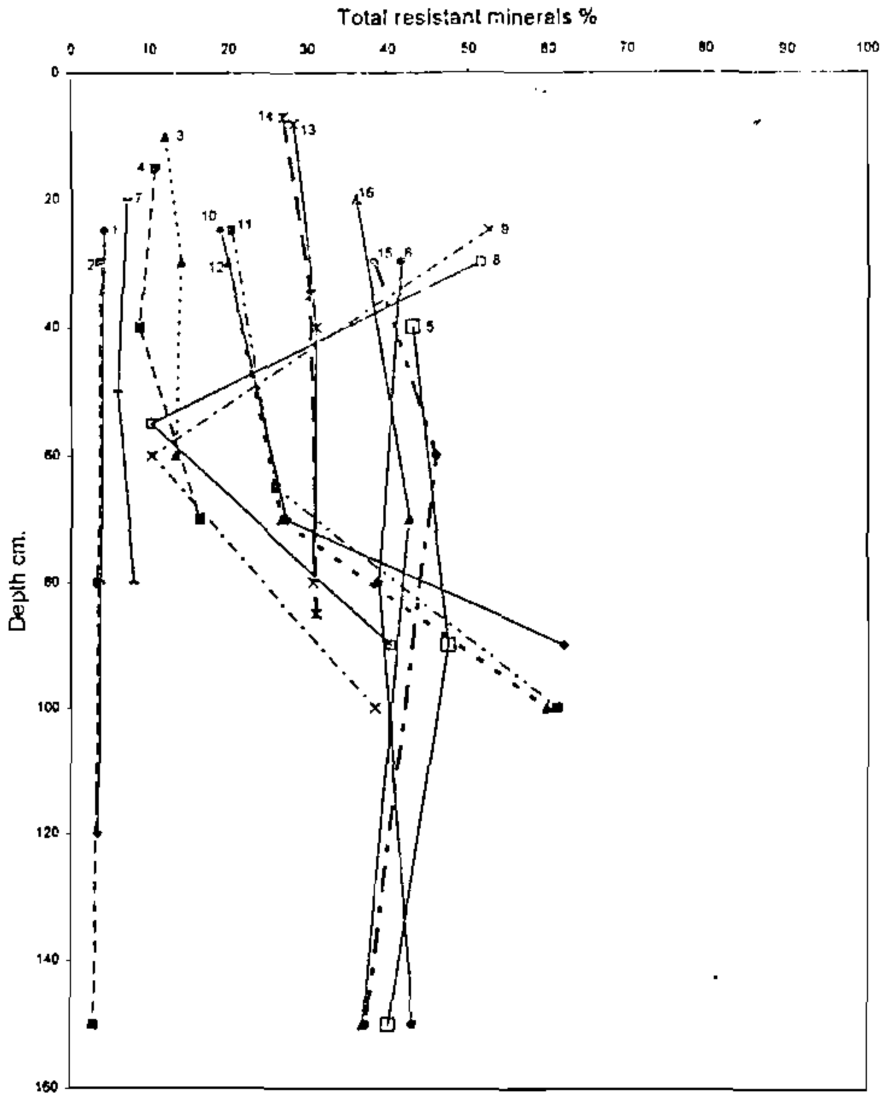

Fig. 3. Distribution in depth of total resistant minerals in the soil profiles

This distribution for the tow Oases may suggest the possible contribution of the Nile tributaries to the formation of their sediments (low content of resistant minerals in some layers) in the Holocene periods. The obtained results show that there is on apparent discontinuity or a type of stratification for the sediments of these Oases.

In Baharia Oases soils (profiles13 and 14), the surface layer contains 27% of the resistant minerals, increasing to 31% in the subsoil. This soil is different from that of the other tow Oases indicating different origin and age.

Metamorphic minerals:

Content and frequency distribution of metamorphic minerals (gamet, kyanite, sillimanite, staurolite and andalusite) for the investigated profiles are presented in Table 1. data reveal that the soils of the Nile delta and valley (profiles 1 and 2) have the lowest percentage (? 4%). The high values is recorded in the soils of El-Kharga (profile 10, 11 and12) and El-Dakhla Oasis (profiles 8 and 9) have the highest percentages (28%). The other soils have values ranging between (6.5-18%). Such results indicate that metamorphic rocks are one of the sources from which the soils of Egypt are derived with different magnitudes.

According to Kholeif et al. (1969), triangular representation of the distribution of amphiboles, pyroxenes and epidotes could be worked out. When the obtained results of such minerals are plotted on the triangular fig. (4), one may observe that the obtained results are located in the area of distribution of pyroxenes, amphiboles and epidotes in the soils of Delta (profile 1), Nile valley (profile 2), the fluvio-marine-lacostrine (profile3), Swamp soils in the deposits of El-Manzala lake (profile 4), the calcareous soils of Wadi El-Natrun (profiles 5 and 6) and the beach sandy sediments of south Idku (profile 7), while the other soils are not contaminated by Nile sediments.

With regard to Kholeif *et al.* (1969), triangular representation of the distribution of mineral characterizing the different geological periods, it is noticed that soils of Oases depressions (El-Kharga, El-Dakhla and Baharia) *are of Pliocene and plio-Pleistocene deposits (Fig. 5). This is due to their* scarcity distribution of pyroxenes and relative abundance of opaques, rutile, tourmaline and homblend (less than in recent sediments).

Their assemblages suggest derivation from sediments, i.e. Nubian sandstone and Oligocene sediments (Shukri, 1952).

On the other hand, soils of Delta and Nile Valley are mainly of Middle Paleolithic sediments. They are characterized by the presence of pyroxenes in greater abundance than in Pliocene and plio-Pleistocene sediments and of smaller amounts than in the recent sediments. This is due to the connection with the Nile tributaries, i.e. Blue Nile and Atbara, which are rich augite of volcanic province (Shukri, 1951).

Also they are rich in epidotes, garnet, zircon and poorer in kyanite, staurolite and tourmaline compared to the older periods.

Regarding the other soils, results indicate that the different layers of their profiles are of Middle to Upper Paleolithic sediments, as they have different quantities of (amphiboles-pyroxenes).

Table 2: Weathering ratios of the studied soil profiles.

Geomorphic Units	Prof. No.	Depth (cm)	Weathering ratios				
							R.M.
Alluvial deposits	1	0-25	1.55	1.21	0.68	18.71	4.2
		25-80	1.46	1.33	0.70	20.21	3.9
		80-120	1.08	1.18	0.57	24.04	3.6
	2	0-30	1.60	1.33	0.73	20.46	3.8
		30-80	3.00	1.00	0.75	19.07	3.5
		80-150	2.80	1.40	0.93	24.21	2.9
Lacustrine deposits	3	0-10	1.00	1.09	0.52	3.28	17.5
		10-30	0.91	1.43	0.56	5.88	14.0
		30-60	1.03	4.00	0.82	6.40	13.3
	4	0-15	2.80	23.33	2.50	5.75	9.8
		15-40	2.40	20.00	2.14	6.98	8.8
		40-70	3.32	1.51	1.04	2.79	16.3
Calcareous sediments	5	0-40	10.14	8.45	4.61	0.64	43.2
		40-90	10.29	3.80	2.78	0.55	47.6
		90-150	12.31	5.71	3.90	0.69	40.2
	6	0-30	13.47	1.01	0.94	1.02	41.7
		30-80	4.40	4.96	2.33	1.11	39.0
		80-150	22.06	9.38	6.58	0.87	43.2
Beach deposits	7	0-20	2.00	3.33	1.25	8.56	7.2
		20-50	3.00	4.50	3.00	8.07	6.0
		50-80	2.55	5.10	1.70	6.72	8.1
Oases	8	0-30	9.88	4.94	3.29	0.34	51.5
		30-55	0.46	3.20	0.46	6.19	10.2
		55-90	4.88	1.15	0.93	0.48	40.5
	9	0-25	11.57	4.76	3.38	0.34	52.5
		25-60	0.51	6.60	0.47	5.32	10.3
		60-100	5.29	1.12	0.93	0.52	38.5
Depression	10	0-25	3.29	2.88	1.53	0.87	19.0
		25-70	21.00	3.39	3.39	0.64	27.2
		70-90	10.11	3.79	2.76	0.34	62.0
	11	0-25	4.48	2.89	1.76	0.77	20.4
		25-65	20.50	3.73	3.73	0.67	26.0
		65-100	11.54	3.69	2.80	0.36	61.1
	12	0-30	3.57	2.50	1.67	0.81	20.0
		30-70	21.50	4.30	4.30	0.67	26.5
		70-100	10.59	4.01	2.91	0.38	59.8
	13	0-8	14.06	5.36	3.88	1.16	28.3
		8-40	11.39	2.30	1.92	0.76	31.2
		40-80	4.06	3.00	1.73	0.97	30.8
	14	0-7	14.00	4.67	3.50	1.25	27.0
		7-35	10.00	2.88	2.23	0.83	30.4
		35-85	3.86	2.79	1.62	0.88	31.2
Aeolian sand	15	0-30	26.67	1.78	1.67	0.65	38.4
		30-60	7.39	4.59	2.83	0.63	46.0
		60-150	7.43	6.44	3.45	0.57	37.4
	16	0-20	38.33	1.84	1.76	0.74	36.1
		20-70	8.16	3.92	2.65	0.71	42.7
		70-150	9.03	4.75	3.11	0.63	37.0

Z = Zircon T = Tourmline R = Rutile P = Pyroxenes
A = Amphiboles R.M. = Resistant minerals (Z+R+T).

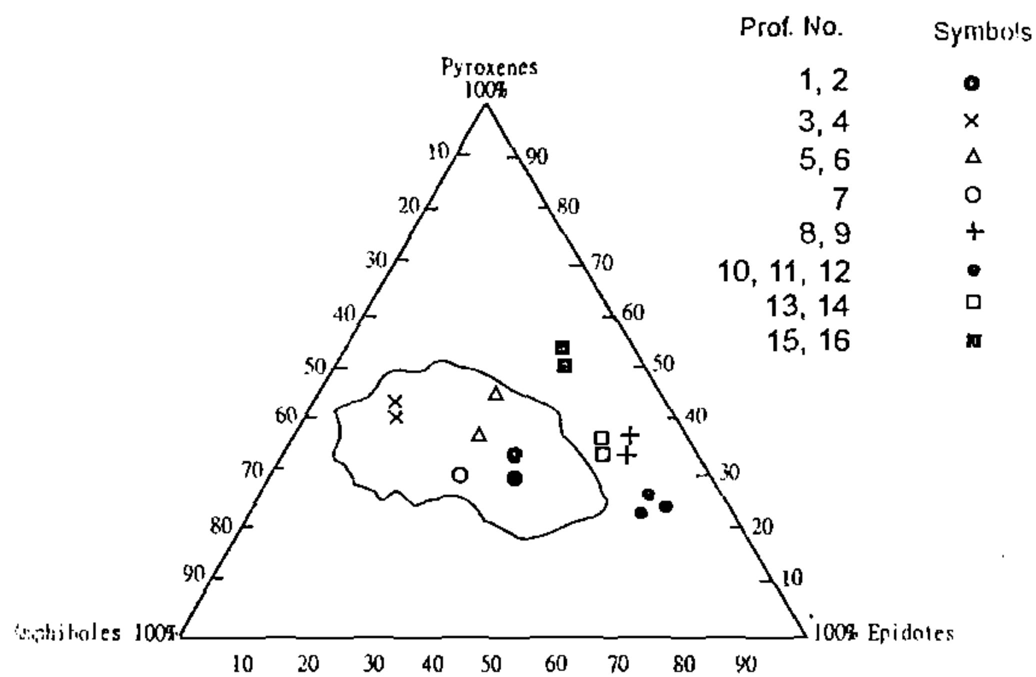

Fig. 4 Triangulay Presentation of the Distributionof Amphiboles, Pyroxenes and Epidotes (after Kholief et al 1969).

Area of distribution of Pyroxenes, amphiboles and epidotes in the main Nile sediments.

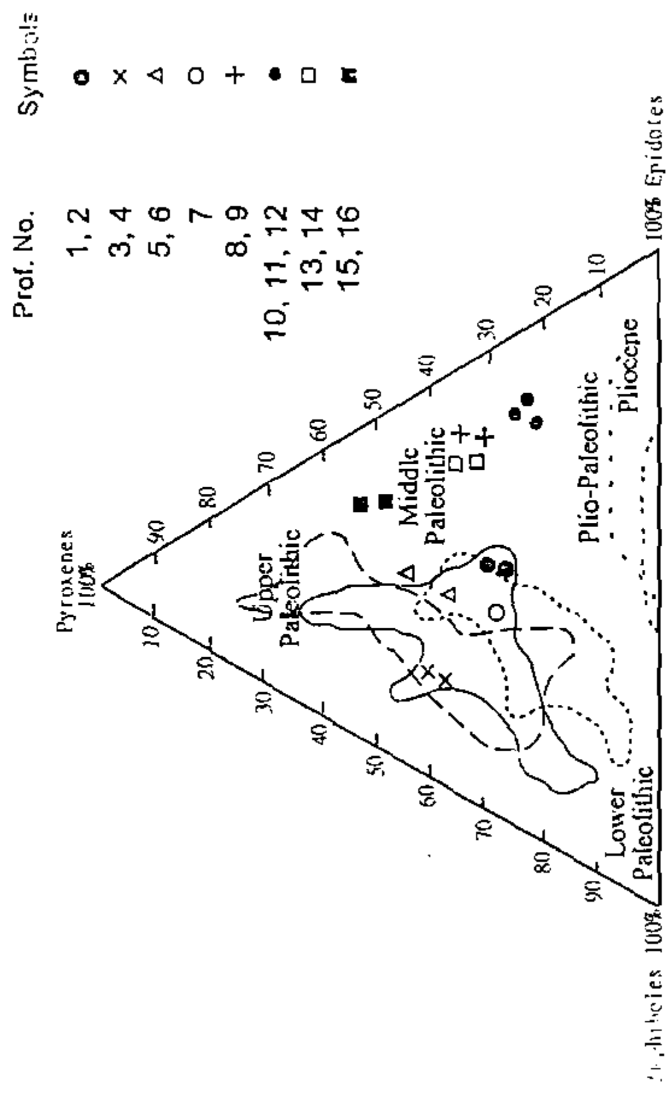

Fig. 5 Relation between Pyroxenes,Amphiboles and Epidotes in pliocene and more Recent Sediments (after Kholief et al 1969).

This could be attributed to local variations along the beaches of the different quantities shows that the Abyssinian tributaries had contributed to Middle Paleolithic times, whereas its presence in appreciable amounts is observed in the Upper Paleolithic and more recent sediments.

Uniformity of soil materials:

To evaluate the weathering stage and uniformity of profile parent materials, certain as pyroboles, zircon, tourmaline and rutile are used to achieve this purpose. Pyrobdes are considered as an assessable minerals to weathering, while zircon, tourmaline and rutile as resistant ones (Brewer 1964). So the presence of the assessable minerals in high percentages can be taken as an indication of the percentages immature conditions or recent deposits. This case is in harmony, when a resistant mineral is existed in low levels. In this connection, the mineral assemblage (Table 2), as well as the ratios of Z / T, Z / R, Z / R+T, P+A / Z+R AND R.M. are calculated for considered profiles in order to evaluate their uniformity. Values show that most of the soils under study have a state of stratification and heterogeneity of their parent materials. This may be the result of the contamination of more than one sediment or suggests the multidepositional regime of the soils. Which display apparent homogeneity with only slight differences rendered mainly to the sedimentation process.

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دراسات بيدولوجية علي أراضي بعض الوحدات الجيومورفولوجيه المختلفة علي أساس التكوين المعدني لمكون الرمل الناعم.

فايزة سلامة على سلامة

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اختير لهذه الدراسة ستة عشر قطاع أراضي تمثل الوحدات المورفولوجيا للأراضي المصرية بهدف التعرف علي أصل هذه الأراضي ومدى تجانس القطاعات الأرضية بها وذلك بدراسة التركيب المترالوجي للرمل الناعم (٢٥٠-٦٣ ميكرون).

وقد تم فصل المعادن الثقيلة لمكون الرمل الناعم وأجرى عليها الفحص باستخدام الميكروسكوب المستقطب لتحديد الأنواع المختلفة للمعادن.

ولقد أوضحت النتائج أن المعادن الثقيلة تتميز بسيادة المعادن المعتمة والبيروكسين والامفيبول والأبيدوت بينما الزركون والتورمالين والروتيل والكلوريت والستوروليت وجدت بنسبه متوسطه أما باقي المعادن فقد كانت بكميات قليلة نسبيا.

وتشير نتائج دراسة توزيع المعادن الثقيلة المقاومة للتجويه وعلاقتها (الزركون / تورملين، زركون / روتيل، زركون / تورملين+روتيل، أمفيبول+بيروكسين / زركون+روتيل) ببعضها بالإضافة إلي استخدام نسب التجوية لتوضيح مدى مساهمة العوامل البيدولوجيه في تكوين وتطوير هذه الأراضي.

ان جميع الأراضي تحت الدراسة ذات مادة أصل متعددةالمصدر وانها تكونت تحت ظروف ترسيبية مختلفة ما عدا الأراضي الرملية فلقد أظهرت تجانس مادة أصلها.

أظهرت الدراسة أيضا اختلافا كبيرا في نسبة المكونات المعدنية السائدة في كل موقع من مواقع القطاعات الممثلة وخاصة المكونات المعدنية الغير متأثرة بعوامل التجوية وهذا يرجع إلي تداخل ظروف التكوين من حيث المصدر أو نتيجة العمليات التكوينية.

كذلك أظهرت نتائج الدراسة وجود دلائل علي تداخل ترسيبات نهر النيل في تكوين بعض الأراضي الجيرية وإلي وجود دلائل علي نشاط بركاني أثر علي أراضي الدلتا والوادى.