Benha University
Faculty of Science
Geology Department
4th year Geology

Geology of Egypt (415G)
Final Ex. (48 marks)
Time Two Hours
Date: 9-1-2019

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Answer

Answer the following questions:

Mesozoic Era

III- Discuss the change in facies from the north to the south in the Cenomanian-Turonian sediments of Sinai (3 marks).

Southern Sinai	Central Sinai	Northern Sinai
Wata Formation (48 m) (late Middle - Late Turonian)	Wata Formation (121 m) (late Middle - Late Turonian)	Wata Formation (102 m) (Early - Late Turonian)
	Buttum Formation (37 m) (Early - early Middle Turonian)	
Abu Qada Formation (59 m) (Early - early Middle Turonian)	Abu Qada Formation (65 m) (Late Cenomanian - Early Turonian)	
Raha Formation (137 m) (Early - Late Cenomanian)	Galala Formation (60 m) (Early Cretaceous - Late Cenomanian)	Galala Formation (422 m) (Late Albian - Late Cenomanian)

IV- Write briefly on the exposed Triassic rocks in Northern Sinai

……………………………………. **(4 marks)**

SINAI

Top:

The Abu Nusra Formtion
Allam and Khalil 1988
Late Landinian –Carnian

The Arif El Naga Formation
Said 1971
Middle Triassic (Anisian)

The Qiseib Formation
Abdallah And Adindani I963
Permo-Triassic

"The Triassic deposits lie about 10 Km west of Egypt - Palestine international boundary, and almost 40 Km south-southeast of Qussaima.

The deposits lie in the center of Gebel Arif El Naga, a dome that is broken on three sides by faults. The succession can be divided into 5 parts starting from base :

1- In the center of the dome is varicoloured sandstone of medium grain; the prevailing colors being violet and white. This, Awad had termed the first or Permo-Triassic "*Nubian Sandstone*".

2- Very highly fossiliferous Muschelkalk, weathering in flags and formed of fossil lumashells in a gypseous sandy or marly matrix. Thickness is 70 to 80 m.

3- A massive series of hard limestones and dolomites with interbedded gypseous clays and marls, poorly fossiliferous in the lower part and devoid of fossils in the upper part. Thickness is 70 to 80 m.

4- The second "*Nubian Sandstone"* is again multicoloured sandstone of coarser grain than the first, red and brown colours are prevailing. This represents the Upper Jurassic - Lower Cretaceous sandstone.

5- The sandstone is followed by Cenomanian, Turonian and Santonian limestones, which form the main Arif El Naga ridge. This is followed by a Maastrichtian chalk country covered here and there by Eocene outliers".

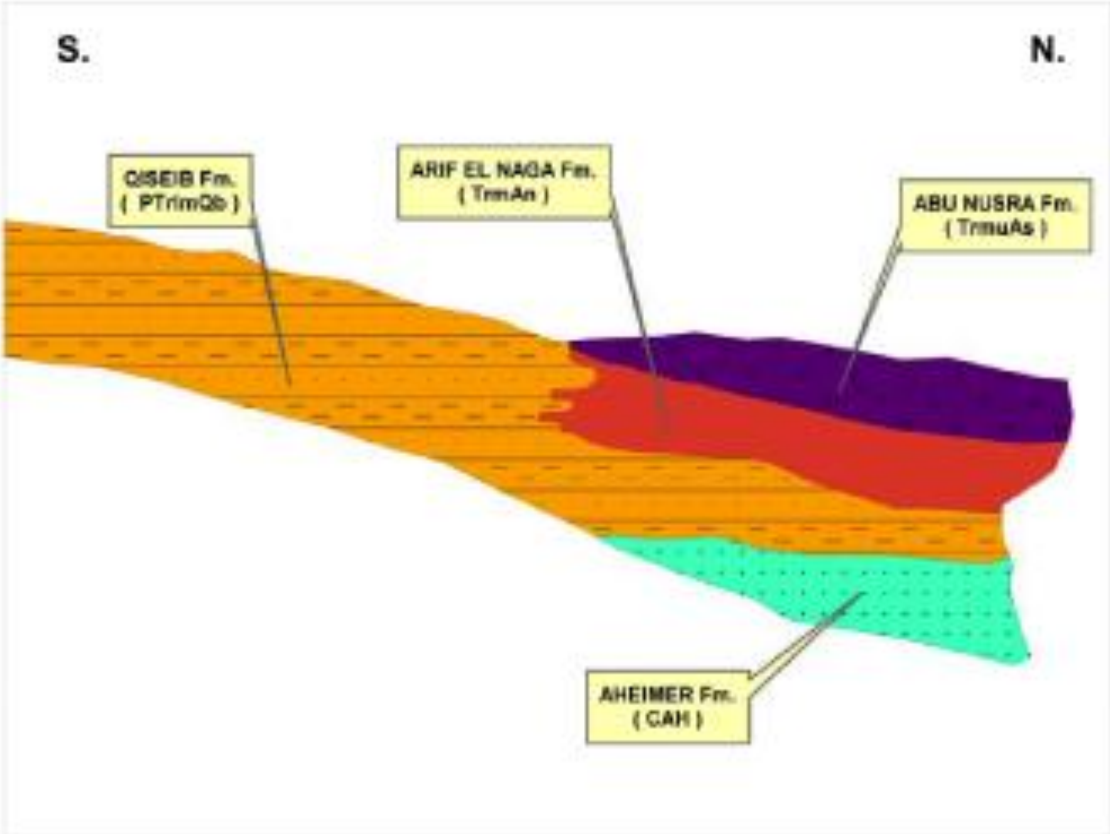

Fig. 23. S- N. Change of facies within Triassic sediments in Sinai

Table 4 - Correlation between different Triassic units in Sinai

	Awad, (1946), Geological Survey of Egypt (1982)	Said (1971) , Druckman (1974), Jenkins (1990)	Present Study
Ladinian - Carnian (Muschelkalk)	Massive series of hard limestones and dolomites with interbedded gypseous clays and marls , poorly fossiliferous in the lower part, devoid of fossils in the upper part .	Arif El Naga "C": The main marine transgression during the Triassic, carbonates identified in Ayun Musa-2 (69 m), Hamra-1 (100 m), Abu Hamath (38 m), Nekhl (35 m) and Halal-1 (275 m) wells. This unit is 116 m at Arif El Naga made of biomicrites, biosparites and shales, grading upward into biomicrites, micrites, dolomicrites, algal stromatolites and dolomitic shales with flat pebble conglomerates. The Mohilla Formation described by Jenkins from Halal-1 well as 50 m dolomitic limestones, shales and anhydrite may be coeval with the top Triassic unit described by Awad.	Abu Nusra Formation (Allam and Khalil 1988).
Anisian (Muschelkalk)	Very highly fossiliferous Muschelkalk; lumachells in a gypseous sandy or marly matrix including *Ceratites* spp. and other fossils at the top of the unit and *Beneckia* sp. at its base……………………20 m	Arif El Naga "B": Argillaceous micrites , biomicrites and biosparites : *Beneckia* - bearing beds………………19 m	Arif El Naga Formation (Said 1971).
Anisian	Varicoloured sandstones, medium-grained……………………………50m	Arif El Naga "A": Multicoloured, fine to medium-grained, well-cemented sandstones, variegated siltstones and shales carrying plant remains……………………50 m	Qiseib Formation (Abdallah *et al.* 1963).
Upper Carboniferous – Lower Permian	Drilling near the core of Arif El Naga dome by the Geological Survey of Egypt reached the basement at 44.75 m depth from the surface, mostly sandstones but fine clastics are not uncommon .		Aheimer Formation (Abdallah and Adindani 1963)

V- With drawing illustrate the Jurassic succession of Gebel El Maghara. (4 marks)

Al-Far (1966) subdivided the Jurassic succession of Gabal Al-Maghara as follows:

6- Masajid Formation (575 m, marine Bathonian- Kim.):
5- Safa Formation (215 m, fluviomarine, Bathonian)
4- Bir Maghara Formation (442 m, marine, Bajocian)
3- Shusha Formation (271 m, fluviomarine, Late Liassic: Toarcian)
2- Rajabiah Formation (292 m, marine, Middle Liassic)
1- Mashabba Formation (100 m, fluviomarine, Early Liassic

6- Masajid Formation (575 m, marine Bathonian- Kim.):
6b: Arousia Mb. 443 91: 9: 0
6a: Kehailia Mb. 132 m 62: 29: 9

5- Safa Formation (215 m, fluviomarine, Bathonian) 29: 37: 34

4- Bir Maghara Formation (442 m, marine, Bajocian)
4c: Bir Member 216m 31: 68: 1
4b: Mowerib Member 134 m 34: 64: 2
4a: Mahl Member 94 m lime: clay: sand 79: 19: 2

3- Shusha Formation (272 m, fluviomarine, Late Liassic: Toarcian)
2- Rajabiah Formation (292 m, marine, Toarcian) 78: 20: 2
1- Mashabba Formation (100 m, fluviomarine, Triassic -Early Jurassic) 27: 23: 50

VI- Correlate the Upper Cretaceous sediments in the Nuba-Abu Ballas and Nile Valley facies and mention their economic aspects. (4 marks)

The Nile Valley Facies :

These facies cover a wide stretch in central Egypt; exposed along the Red Sea coast between Safaga in the north till south of Qusseir, along the Nile Valley between Qena in the north and Idfu in the south and crop out in Kharga and Dakhla depressions.
The facies also were recorded within the dunes of the Great Sand Sea west of Dakhla Oasis till the Egyptian-Libyan border
The most important horizon in these facies is the economic phosphate beds within the Duwi Formation.
These beds never developed north or south of the Nile Valley Facies.
As mentioned before, the environmental conditions were deep in the north giving rise to a carbonate sequence, shallow in the south depositing an arenaceous section.

1- The Nubia Formation:

b- The Quseir Variegated Shale = Quseir Clastic Member

a-The Taref Sandstone Member

2- The Duwi Formation:

3- ***The Dakhla Formation (*****Said 1961)**

Economic aspects:

1- **phosphates are produced from the Duwi Formation in the Nile Valley, Abu Tartur Plateau and in the Qusier-Safaga district.**

- ## The Nuba- Abu Ballas Facies:

- **The Nubia - Abu Ballas Facies cover the area south of lat. 24° 30' N approximately to lat. 22° N and between the Red Sea coast and the Libya – Egypt border.**
- **The area thus makes 1/5 of Egypt.**
- **The characteristic features of these facies are:**
- **1- Cyclic development of marine and continental facies during the Aptian - Albian up to the Coniacian - Campanian.**
- **2- The lack of phosphatic beds**
- **3- The Turonian is also missing and a major hiatus is found at the Cenomanian - Coniacian contact.**

- ***The Nubia Formation***
- **- The Qusseir Clastic Member; shallow marine to deltaic facies.**
- **- The Taref Sandstone Member; continental.**
- ***The Timsah Formation***
- **- The Timsah iron beds, clays and sandstones; lacustrine and deltaic facies.**
- ***The Burg Formation***
- **- The Heiz or Maghrabi Formation; shallow marine facies**
- **- The Bahariya or Sabaya Formation; shallow marine to continental and deltaic facies.**

- ***The Abu Ballas Formation***

Economic aspects:

Aswan oolitic iron ores were once exploited from the Cretaceous clastics NE of Aswan (Timsah Fm.).

Prof. Gamal El Qot