

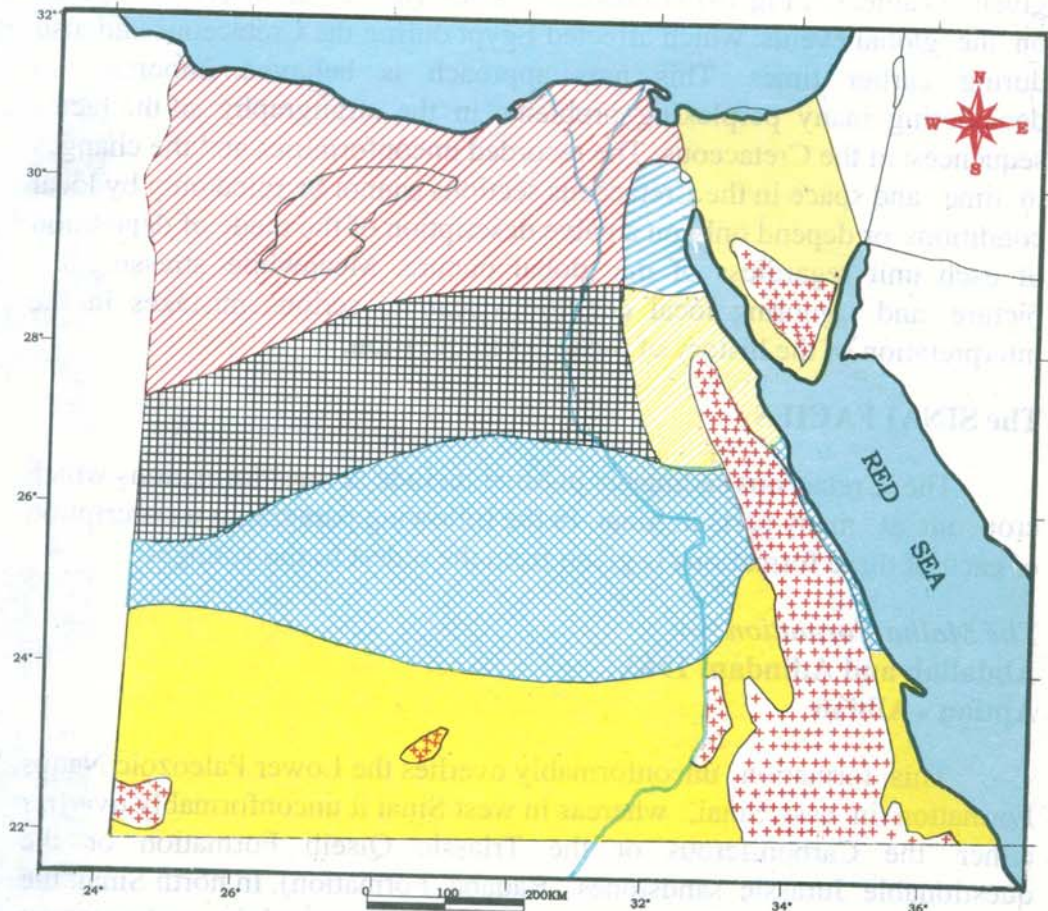
**Benha University**  
**Faculty of Science**  
**Geology Department**  
**Date:14-6-2017**



**Biostratigraphy (210)**  
**Final Ex. (24 marks)**  
**Time One Hour**  
**2<sup>nd</sup> year Geology & Chm.**

**Answer of A- Lithostratigraphy (210 G)**

**I- Draw a lithostratigraphic map of Egypt during the  
Cretaceous Neothyses, choose one of these facies and described  
it in details**



- LEGEND**
- SINAI FACIES
  - ATAQA FACIES
  - SOUTHERN GALALA FACIES
  - NILE VALLEY FACIES
  - NUBA ABU BALLAS FACIES
  - FARAFRA BAHARIYA FACIES
  - NORTH WESTERN DESERT FACIES
  - BASEMENT ROCKS

**Fig. 13 - Different Cretaceous Facies in Egypt**

			Sinai
		Maastrichtian	80-250m chalk & chalky Ls with <i>Ostrea vesicularis</i>
		Qadiera	35-50m Ls, marl, and shale beds with v. hard quartzitic bands.
		Campanian	65-85m Ls, marl, phosphatic and dark chert bands, fossiliferous.
		Duwi	
		Santonian	80-150m Ls, chalky, marly, fossiliferous.
		Matulla	
		Coniacian	15-40m Ss, red clay, gypseous, oysters in Wadi Feiran
		Faref SsMb.	
		Turonian	40-70m dol. Ls, marl & Ls. fossiliferous.
		Wata	
		Button	15m crystalline gypsum, shale & sandy silt
		Abu Qada	35-141m alternating shale marl and hard marly Ls rich in ammonites.
		Cenomanian	350m Ls in Gebel Halai, 70-180m shale. marl and Ls in other parts in Sinai. fossiliferous.
		Galala	
Barremian, Aptian, Albian	Malha		40-100m in west Sinai, 250m in east Sinai, 1000m in the subsurface mostly Ss, clay and conglomerate at base, fossiliferous.

## II- Identify the facies and write in its three types.

**السحن والتغيرات السحنية**  
**Facies and Facial Variation**

ان أول من أدخل كلمة سحنة (Facies) في علم الارض هو الجيولوجي السويسري جريسلي ١٨٣٨ م اثناء دراسته في سويسرا لصخور العصر الترياسي والجوراسي في جبال جورا الشرقية . لقد ميز جريسلي المقطع الجيولوجي الى وحدات متعددة ، لكنه لم يبتغ بدراسة التعاقب العمودي لهذه الصخور في نقاط مباعدة ومتفرقة .

كبديل لهذا المقرب في البحث قرر جريسلي دراسة الامتداد الجانبي لكل وحدة وعلى طول خط المضرب . هذا المقرب أوضح في الحال وجود تغيرات جانبية في لثولوجية والمتحجرات هذه الوحدات .

لقد وجد جريسلي ان ليس كافياً وصف الطبقات بشكل تعاقبها العمودي لذا ولتوضيح التغيرات الجانبية في لثولوجية والمتحجرات كل وحدة صخرية ، اطلق كلمة سحنة (Facies) للدلالة على مجموع الصفات اللثولوجية والحياتية لوحدة من

الصخور الرسوبية والتي يستدل من هذه الصفات على أصل وبيئة ترسب هذه الوحدة - الكلمة (Facies) تعادل الكلمة الانكليزية (Aspect) أي المظهر .

منذ ان استهل جريسلي الكلمة لأول مرة والمصطلح يتوارد في مختلف الأدبيات الجيولوجية . . . فقد يقصد بالمصطلح سحنة من الناحية الجيولوجية ، المظهر العام للصخور ، من الناحية اللثولوجية والحياتية والى أبعد من ذلك التكتونية الحركية .

## B- Answer of Biostratigraphy

**I- Write on three of the following:**

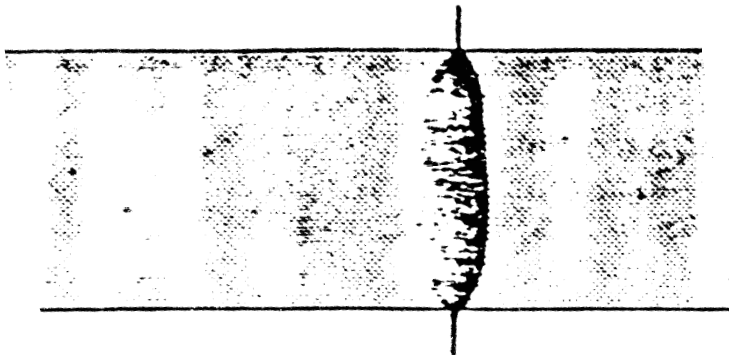
**(6 marks)**

a- Peak Zone, Range zones, and lineage zone

### **Peak Zone:**

A body of strata representing the acme or maximum development usually maximum abundance or frequency of occurrence of one or more species.

Name: The acme zone takes its name from the taxon or the taxons whose zone of maximum developm



### **Range Zones :**

**Taxon Range (Total Range) Zone**

A body of strata representing the total range of occurrence (Horizontal and Vertical) of a particular taxon.

The taxon range zone is particularly valuable as an indicator of geologic age because of the limited time range.

It may be as global in extent.

Boundaries: The boundaries of a taxon range zone are surfaces (biohorizons) marking the outermost limits of known occurrence (i.e. The limits are those of the origin and the extinction; FO or FAD to LO or LAD) of the assemblage characteristic of the unit.

The boundaries of a taxon range zone are continually subject to change with new discoveries.

Local Range Zone: The local range zone is used to indicate the range of a taxon in some particular areas.

Name: The name of a taxon range is named from the taxon whose range expresses.

### **Concurrent Range Zone**

The concurrent or the coincident parts of two or more specified taxons selected from among the total forms contained in a body of strata.

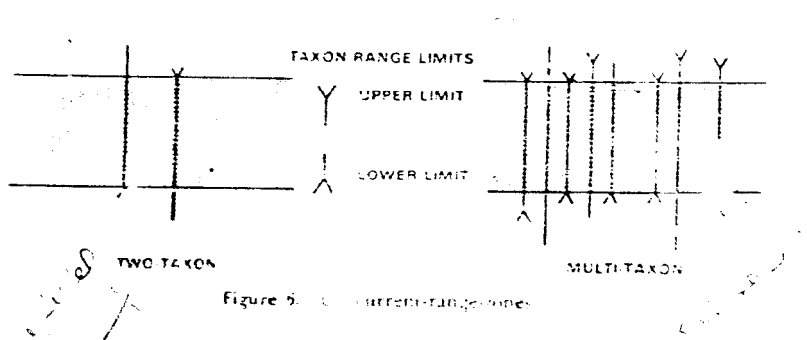
Boundaries: The boundary of a concurrent range zone is the outer limits of the occurrence of the selected taxons designated as diagnostic of the zone.

Boundaries: The boundary of a concurrent range zone is the outer limits of the occurrence of the selected taxons designated as diagnostic of the zone.

If only two taxons are considered diagnostic of the zone the determination of boundaries is relatively simple.

However, with more than two taxons are diagnostic of the zone the determination of the boundaries becomes increasingly complex.

Name: A concurrent range zone is named from the two or more of the taxons which characterize the zone by their concurrence.



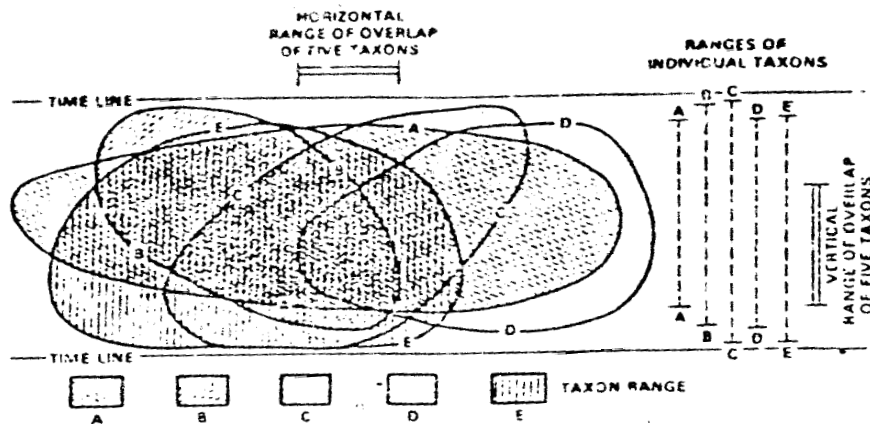


Figure 7. Variations in extent of a concurrent-range-zone depending on number of taxa and degree of concurrence required. Interval between horizontal time-lines represents cross section through a sequence of essentially horizontal sediments. For simplicity, picture is two dimensional, and continuous distribution of each taxon within its pattern (A, B, C, D, or E) is assumed. Vertical lines at right show vertical range for each taxon. Double line at extreme right shows extent of overlap in vertical range for all five taxa. Double line at top shows extent of overlap in horizontal range for all five taxa.

## Lineage Zone

(Phylozone, evolutionary zone, morphogenetic Zone)

Is a type of range zone, in which a body of strata containing specimens representing a segment of an evolutionary or developmental line or trend, defined above and below by changes in features of the line or trend.

It may represent a number of successive taxa in evolutionary descent or sequence of forms in a single taxon.

Name: A lineage zone may simply be named after the key taxon.



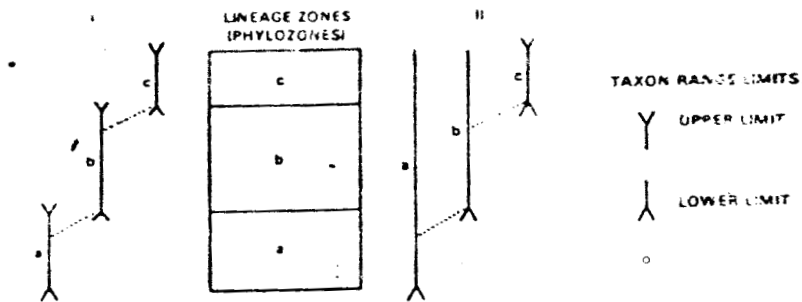


Figure 9. Theoretical examples of lineage-zones or phylozones. In Example I, a, b, and c are range-zones of taxa a, b, and c (or forms a, b, and c within a single taxon). In Example II, a and b are parts of range-zones and c is a complete range-zone. Other examples of lineage-zones could be drawn for different evolutionary patterns.

## b- Lower Cretaceous ammonite biozones.

- 8- *Mortoniceras inflatum* Zone (Late Albian)
- 7- *Knemiceras gracile* Zone (Early Albian)
- 6- *Acanthohoplites nolani* Zone (Late Aptian)
- 5- *Epicheloniceras tschernyschewi* Zone (late Middle Aptian)
- 4- *Aconeceras nisus* (early Middle Aptian)
- 3- *Deshayesites deshayesi* Zone (Early Aptian)
- 2- *Barremites difficilis* Zone (Late Barremian)
- 1- *Subpulchellia oehlerti* Zone (Late Barremian)

## c- Upper Cretaceous inoceramid biozones.

- 1- *Inoceramus atlanticus* Total Range Zone (late Middle Cenomanian).
- 2- *Inoceramus ptictus* Total Range Zone (Late Cenomanian)

3- *Mytiloides labiatus* Total Range Zone (Early Turonian)

4- *Cladoceramus undulatoPLICATUS* (Early Santonian)

5- *Inoceramus rigularis* Total Range Zone (Maasterichtian)

#### d- Cenomanian-Lower Senonian oyster biozones

1- *Ilymatogyra africana* Zone (Late Cenomanian)

2- *Costagyra olisiponensis* (Late Cenomanian)

3- *Gyrostrea thevestensis* Zone (Coniacian)

4- *Nicaisolopha tissoti* Total Range Zone (Santonian)

5- *Nicaisolopha nicaisei* – *Pycnodonte (Phygraea) vesicularis* Assemblage Zone (Late Campanian).

#### II- Correct the following sentences:

(3 marks)

a- The coccolithophorids are limited to the Cambrian Period.

**a-The archocythyids** are limited to the Cambrian Period.

b- The graptolites are considered good index fossils for the Mesozoic Era.

b- The graptolites are considered good index fossils for the **Paleozoic Era.**

c- The rudists are firstly appeared nearly at the Middle of the Carboniferous period.

c- The rudists are firstly appeared nearly at the Middle of the **Jurassic** period.

**III- Compare between the following: (3 marks)**

**a- Edicara and Solnhofen fossils**

**Edicara fossils:** Fossils of many called animals appear near to the close of the Proterozoic (Edicaran or the last Period of Neoproterozoic Era). They represent fossils of three phyla (Coelenterates, Annelids, and Arthropods).

**Solnhofen fossils** are those rare fossil occurrences of soft-bodied animals which are rarely preserved in the geologic record.

Near **Solnhofen-Eichstatt area (Southern Germany)**, there are **deposits of very fine-grained limestone (Solnhofen limestone)** was deposited in quiet broad lagoon in the Late Jurassic.

This limestone contains fishes, jellyfish, insects, pterosaurs, birds, and many other forms.

The body outlines showing jellyfish tentacles, insect wings, pterosaur wing membranes, and the feather of the oldest birds are preserved as impressions. A similar deposits were found recently in the U. S. S. R.

**b-Late Paleozoic and Mesozoic zonal fossils.**

**Late Paleozoic:**

a-Trilobites, Goniatites

b- Brachiopods, Corals, Crinoids, Fusulines, Conodonts,

**Mesozoic:**

Ammonites, Inoceramids, Rudists, Echinoids

Planktic foraminifera, Nanoplanktons, Diatoms, Polen grains,

**Best regards**

**Prof. Dr. Gamal El Qot**