Benha University
Faculty of Science
Geology Department
Date: 10-1-2019

Biostratigraphy (G 669)
Final Exam (80 marks)
Time Three Hours
Msc. Stratigr. & Paleontology

Answer

I- Write in four only of the following: (20 marks)

a- Problems in biostratigraphy.

- **Many knids of fossils are facies-controlled**
- **Some kinds of fossils are very long-ranged.**
- **Such good zonal fossils as the graptolites are delicate and only preserved in quiet environments, being destroyed by more turbulent conditions.**
- **Reworked fossils**
- **Introduced or infiltrated fossils**
- **Overlaps and Gaps between units**
- **Effects of stratigraphic condensation**

b- Range, Acme, and lineage zones

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 limitsare 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 cotinually 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.

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

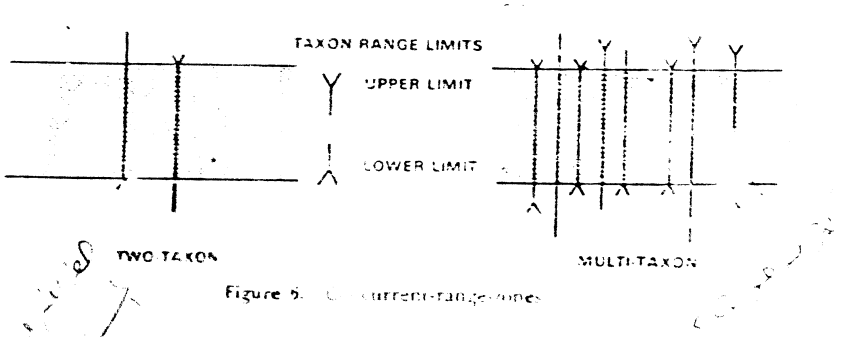


Figure 5. [illegible] current-range zones

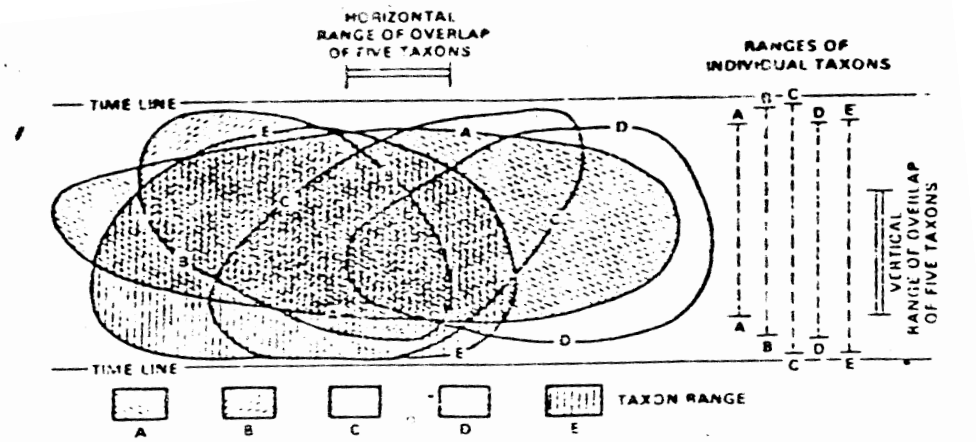


Figure 7. Variations in extent of a concurrent-range-zone depending on number of taxons and degree of concurrence required. Interval between horizontal time-lines represents cross section through a sequence of essentially horizontal sediments. For simplicity, picture is two dimensional, and continuous 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 taxons. Double line at top shows extent of overlap in horizontal range for all five taxons.

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 taxons in evolutionary descent or sequence of forms in a single taxon.

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

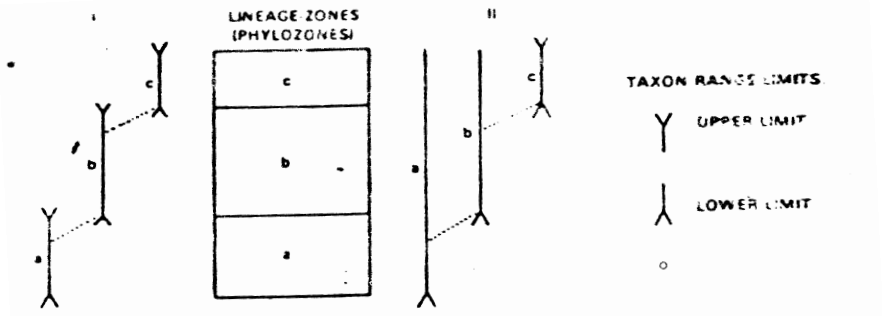
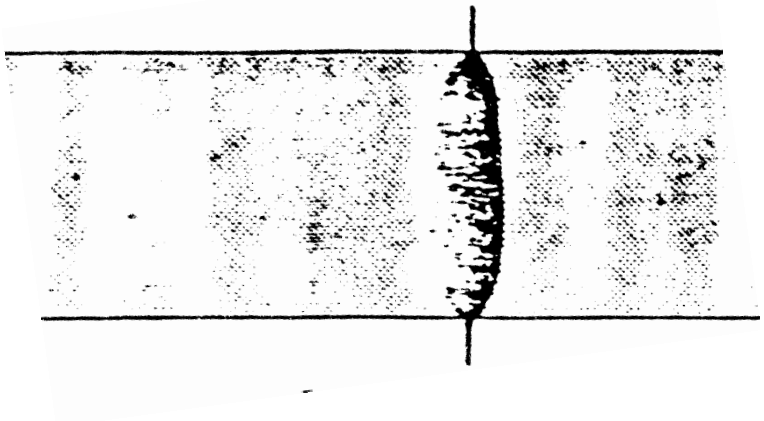


Figure 9. Theoretical examples of lineage-zones or phylozones. In Example I, a, b, and c are range-zones of taxons a, b, and c (or forms a, b, and c within a single taxon). In Example II, a and b are parts of range-zones and c is a complete range-zone. Other examples of lineage-zones could be drawn for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

Acme 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



C- **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)**

d- 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)**

e- Cenomanian-Santonian oyster biozones

1- *Ilymatogyra africana* Zone (Late Cenomanian)

2- *Costagyra olisiponensis* (Late Cenomanian)

3- G*yrostrea 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: (8 marks)

a- In Egypt, the Cretaceous sediments are rich with ***Orbitolina*** while, the Eocene sediments are characterized by the genus ***Nummulites***

b- The graptolites are nearly limited to the Early **Paleozoic**.

c- The rudists are firstly appeared nearly at the Middle of the **Mesozoic** Era.

d- The **ammonites** are considered good zonal fossils for the Mesozoic Era.

III- Compare between the following: (12 marks)

a- Paleozoic, Mesozoic, and Cenozoic zonal fossils.

Paleozoic:

a-Trilobites, Graptolites, Goniaties

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

Mesozoic:

Ammonites, Inoceramids, Rudists, Echinoids

Planktic foraminifera, Nanoplanktons, Diatoms, Polen grains,

Cenozoic:

a- Planktic foraminifera, Nanoplanktons, Diatoms, Polen grains

b- Echinoids, Benthic foraminfera

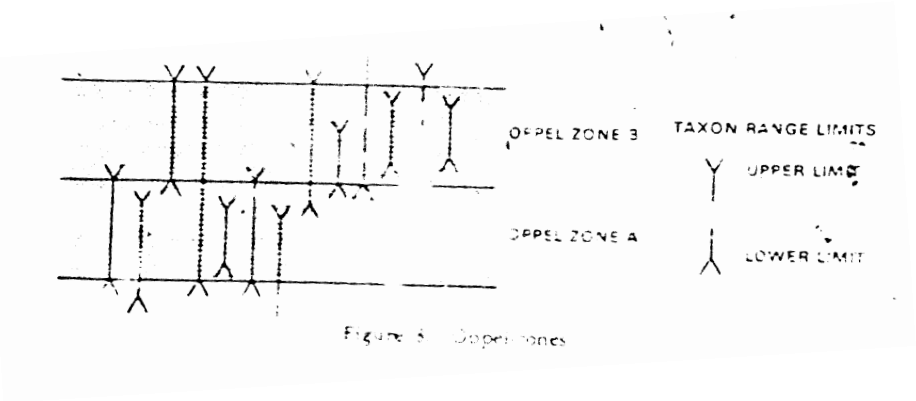
b – Oppel and Assemblage Zones.

Oppel Zone

- The Oppel Zone named after the German StratigrapherAlbert Oppel (1831- 1865)
- Oppel Zone: The zone is characterized by an association or aggregation of selected taxons of restricted and largely concurrent range, chosen as indicative of approximate contemporaneity.
- **Boundaries:** The boundaries of an oppel zone are the limits of distribution of the fossil forms considered distinctive of the zone. (i.e.

The body of the zone is marked largely by concurrences of the diagnostic taxons)

- The lower boundary of the zone is marked by the first appearance and its upper boundary by last appearance of certain taxons.
- The oppel zone is difficult to define empirically because judgement may vary as to how many and which of the selected diagnostic taxons need be present to identify the zone.
- **Name:** The name of an oppel zone is derived from some prominent taxons, which may or may not be everywhere present in the zone.



Assemblage Zone

A body of strata characterized by a distinctive natural assemblage or association that distinguishes it in biostratigraphic characters from adjacent strata.

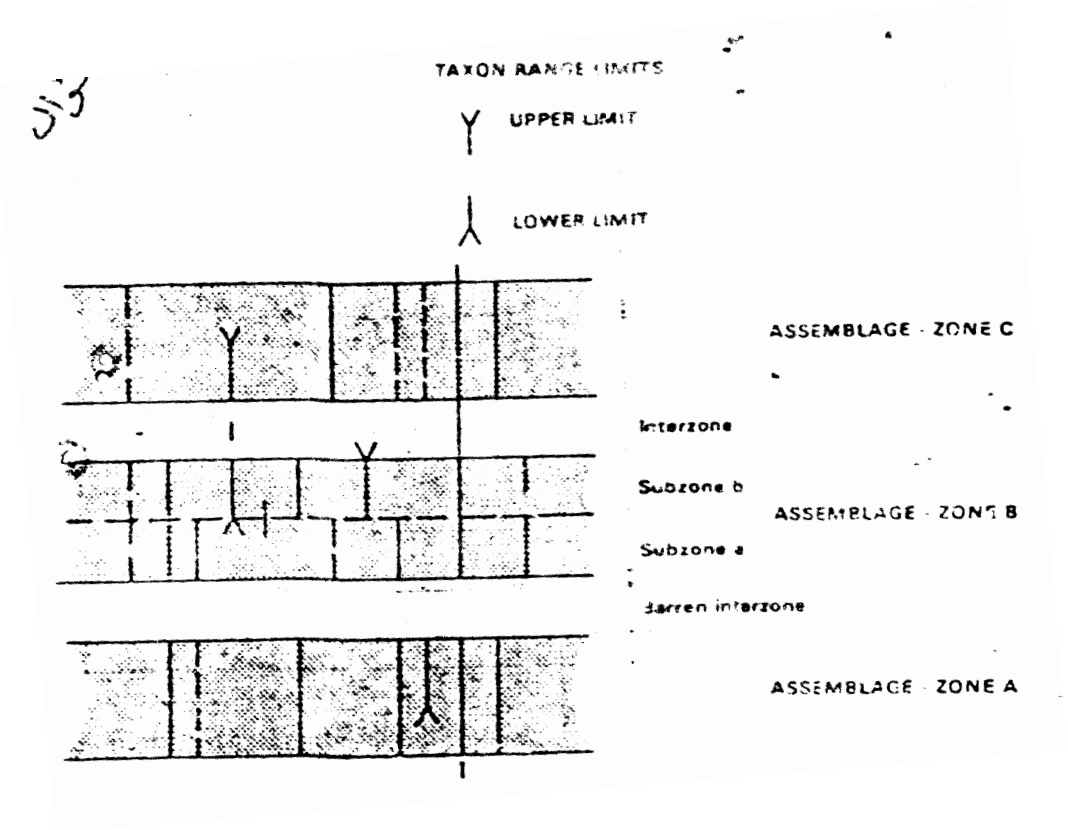
Assemblage zone are usually linked in practice to local areas or regions as they are closely linked with life environments that vary greatly geographically.

The assemblage zone is particularly significant as an indicator for environment.

It is also a general indicator of geologic age (local correlation)

Boundaries: Assemblage zone boundaries are drawn at surfaces (biohorizons) marking the limits of occurrence of the assemblage characteristic of the unit.

Name: The name of an assemblage zone should preferable be derived from two or more of the prominent and diagnostic constituents of the fossil assemblage.



c- Chronostratigraphical and Geochronological units

Chronostratigraphical units	Geochronological units
• Eonothem	Eon
• Erathem	Era
• System	Period
• Series	Epoch
• Stage	Age

(Best wishes)

Prof. Dr. Gamal El Qot