

Benha University

**Faculty of Science
Geology Department
2nd year Geology &
4th Botany and Chemistry**



**Fossilization and plant
fossils (219G)
Final Ex. (48 marks)
Time Two Hours**

Date 23-1-2019

Answer

I- Fossilization

I- Write on four only from the following: (8 marks)

a – Binomial nomenclature of fossils.

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The fundamental unit of biological classification is the species.

Members of a species are able to interbreed and give rise to fertile offspring.

Palaeontologists, lacking evidence of reproductive isolation of ancient “species”, focus on morphological definitions of species. Above the species level are increasingly more inclusive groups which are defined by certain characteristics possessed by all their members.

Binomial Nomenclature Linnaeus (1758)

Types: (Holotype& Paratypes)Type species:Open Nomenclature: affinis=

aff. e.g *Lophaff. dichotomaconfer* = cf. e.g *Lophacf. dichotomasp.* e.g

Lophasp. Synonyms: Homonyms: Law of priority:

b- The Nebular Hypothesis

A great spherical cloud of hot gases that slowly rotated. As it rotated, it continually speeded up and the result is a flattened disc.

c- Common mineral components of the skeleton of marine organisms.

Calcium carbonate CaCO_3 Principal mineral components of most sea shells. Two common calcareous minerals in sea shells:

Aragonite – unstable over geological time.

Aragonitic shells commonly are dissolved (preserved as moulds) or transform to calcite (poor preservation of primary textures).

Calcite – stable over geological time. Consequently, calcitic (e.g. brachiopod) shells tends to be well-preserved.

Silica SiO_2 – Usually amorphous hydrated silica (Opal A) which commonly transforms to quartz and other silica minerals following death.

Opal may be well preserved in pelagic sediments, if deeply buried. This is the principal “mineral” component of the skeletons of some sponges, and micro-organisms such as diatoms and radiolarians. Skeletons may be lost or degraded through opal dissolution and obliteration of the original amorphous structure through quartz crystallization.

Calcium phosphate (apatite)

$\text{Ca}_3(\text{F,Cl,OH})(\text{PO}_4)_3$ – stable over geological time (tends to be well-preserved). Principal mineral component of bones, teeth and some shells.

d- The main physical events through the Cenozoic Era

- 1- The Americas were separated from Europe and Africa except for a connection across the North Atlantic where Greenland formed a passable land bridge.
- 2- In the Southern Hemisphere Australia and Antarctica had lost contact with all other southern lands but remained joined to each other until the Eocene.
- 3- Antarctica soon drifted southward into a polar position and Australia commenced a northward trip that is still continuing today.
- 4- The formation of the great Alpine and Himalayan ranges, were basically due to northward movement of Africa and other southern blocks towards Eurasian lands.
- 5- The Arabian peninsula, which was originally part of Africa split apart from the parent continent to create the Red Sea in the Oligocene and Miocene and at the same time pushed up the Zagros ranges and became part of the Eurasian continent.
- 6- The most spectacular of all was the collision of India in the Eocene and Oligocene giving rise to the Himalayan ranges and Tibetan Plateau.
- 7- All these dramatic movements reached a culmination in the middle Tertiary to create one of the earth's greatest disturbance the Alpine Revolution (cf. Alpine Orogeny).

II- Choose the correct answer:

(5 marks)

- a- The *Orbitolina* are considered among the diagnostic foraminifera for (Carboniferous, Eocene, **Cretaceous**).
- b- One of the following is not belonging to the Neogene period (Miocene, Pliocene, **Oligocene**).
- c- One of the following is not belonging to the geochronological units (Period, **Stage**, Epoch).
- d- The radiolaria are belonging to (Kingdom Plantae, **Kingdom Protista**, Kingdom Animalia).
- e- The ammonoids are firstly appeared nearly at the Middle of the (**Paleozoic** Era, Mesozoic Era, Cenozoic Era).

III- Correct the following sentences: (4 marks)

- a- The rudists are extinct at the end of the **Mesozoic** Era.
- b- The Old Red Sandstone Continent is formed during the **Paleozoic** Era.
- c- The Archaeocyaths are firstly appeared in the **Cambrian** Period
- d- The irregular echinoids are firstly appeared in the **Jurassic** Period

IV - Compare between the following: (7 marks)

- a- Solnhofen and Edicara fauna.

Solnhofen Fauna 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.

Edicara fauna: 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) Ediacara-type fossils represent a group of soft-bodied organisms, mainly known from imprints.

b- Mesozoic and Cenozoic marine invertebrates

Mesozoic:

Corals, Sponge, Bryozoans, Crinoides, and Brachiopodes are generally rare in the Mesozoic rocks.

However, Mollusks became the most important invertebrates of the Mesozoic seas

This include;

Bivalves (Rudists, Inoceramids, Oysters), Gastropods, and Cephalopods (Ammonites, Belemnites)

In addition to the Foraminifera and Ostracods.

Cenozoic:

Marine Invertebrates:

1-Protistans (unicellular organisms with nuclei)

-Protophyta (predominantly autotrophic unicellular organisms)The pelagic golden algae particularly the coccolithophores, silicoflagellates, the siliceous diatoms, dinoflagellates, and the red algae.

-Protozoa (predominantly heterotrophic unicellular organisms)The foraminifera both bentic and planktonic

2- Animals:

Marine Invertebrates:Hexacorals, Bryozoan, Mollusca;Bivalves (Pelecypods), Gastropods and Cephalopods, Annelids, Crustacean (ostracods), and Echinoids.

c- Paleozoic and Mesozoic Mass Extinctions:

Paleozoic mass extinction

When (End of...)	Species Loss**	Major Loses to
Ordovician	85 ±3%	Brachiopods & bryozoans
Devonian	83 ± 4%	Rugose & tabulate corals, armored* & jawless fish
Permian	95 ± 2%	All life! - Trilobites*, corals*, blastoids*

Mesozoic Mass extinction

Triassic	$80 \pm 4\%$	Most synapsids
Cretaceous	$76 \pm 5\%$	Dinosaurs, marine reptiles, ammonites

Prof. Gamal El Qot