

*University Of Basrah*

*College of Science*

*Department of Geology*

# STRATIGRAPHY

Lectures Notes for Third Class Undergraduate Students

**Instructed by**

*Dr. Nawrast Sabah Abdalwahab*

*Academic Year 2022-2023*

Table of Contents

PART I: BASIC OF STRATIGRAPHY	2
Chapter One	2
INTRODUCTION	2
Definition	2
Important of Stratigraphy	2
Phases of Study	2
Laws of Stratigraphy	3
Bibliography	7

## PART I: BASIC OF STRATIGRAPHY

### Chapter One

#### INTRODUCTION

##### Definition

**Stratigraphy: is the science of rock strata.**

What does that mean?

- Stratigraphy is concerning with age relationships of strata.
- Successions of beds, local and worldwide correlation of strata.
- Stratigraphic order and chronological arrangement of beds in the geological column.

##### Important of Stratigraphy

- Stratigraphy gives you techniques for working out earth history.
- How earth and its life forms evolved?
- Test ideas on how varying combinations of process affect the plants through time?
- Together, history and process let you work out how, when, and why environments changed through time.
- Stratigraphy also helps you to understand how many economic materials formed and got distributed in the way they did- and so will help you find more.

##### Phases of Study

###### Phase 1: Basic

The basic needed before any stratigraphic studies, involve first being able to:

1. Identify and classify minerals, rocks, and fossils accurately.
2. Infer the processes that formed the minerals, rocks, and fossils from field and laboratory studies.
3. Recognize the ancient depositional (and rarely non-depositional) environments.
4. Map the obtained data on maps and sections of various types.

## STRATIGRAPHY

### Phase 2: Tracing environments in space and time.

Tracing environments in space and time requires four steps:

1. An overview of the area studied.
2. The description of local sections.
3. The correlation of local sections in space and time.
4. The reconstruction of sedimentary basin history.

### Phase 3: Interpreting geologic history.

Interpreting geologic history involves:

Evaluating the effects of controlling processes such as tectonics, sea level changes, climate, and biology (the effect of organism) on sedimentary basin history.

## Laws of Stratigraphy

### 1. Original Horizontality

"Strata either perpendicular to the horizon or inclined to the horizon were at one time parallel to the horizon." Steno, 1669.



FIGURE 1 THE PERMIAN (BOTTOM) THROUGH JURASSIC (TOP) STRATIGRAPHY OF THE COLORADO PLATEAU AREA OF SOUTHEASTERN UTAH THAT MAKES UP MUCH OF THE FAMOUS PROMINENT ROCK FORMATIONS IN PROTECTED AREAS SUCH AS CAPITOL REEF NATIONAL PARK AND CANYONLANDS NATIONAL PARK. FRO

### 2. Lateral Continuity

"Material forming any stratum were continuous over the surface of the Earth unless some other solid bodies stood in the way." Steno, 1669.



# STRATIGRAPHY

FIGURE 2 LATERAL CONTINUITY. LAYERS OF THE SAME ROCK TYPE ARE FOUND ACROSS CANYONS AT THE GRAND CANYON

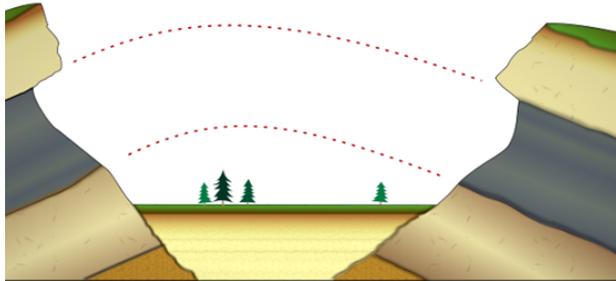


FIGURE 3 [HTTP://WWW.GEOLOGYIN.COM/2014/02/THE-PRINCIPLE-OF-LATERAL-CONTINUITY.HTML](http://www.geologyin.com/2014/02/the-principle-of-lateral-continuity.html)

## 3. Superposition

"...at the time when any given stratum was being formed, all the matter resting upon it was fluid, and, therefore, at the time when the lower stratum was being formed, none of the upper strata existed." Steno, 1669.

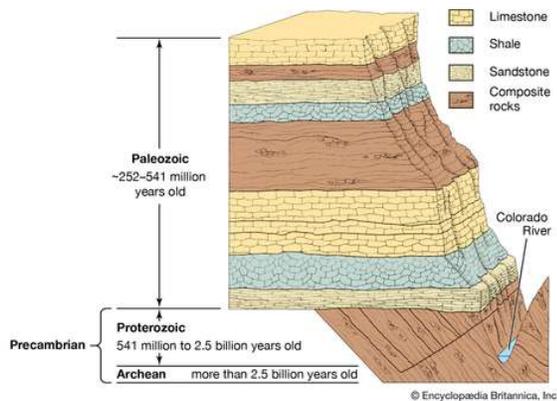


FIGURE 4 [HTTPS://CDN.BRITANNICA.COM/S/500X350/86/106986-050-0119C0F2/GRAND-CANYON-WALL-CUTAWAY-DIAGRAM-ROCK-LAYERS.JPG](https://cdn.britannica.com/S/500X350/86/106986-050-0119C0F2/GRAND-CANYON-WALL-CUTAWAY-DIAGRAM-ROCK-LAYERS.JPG)

## 4. Cross-Cutting Relations

"If a body or discontinuity cuts across a stratum, it must have formed after that stratum." Steno, 1669.

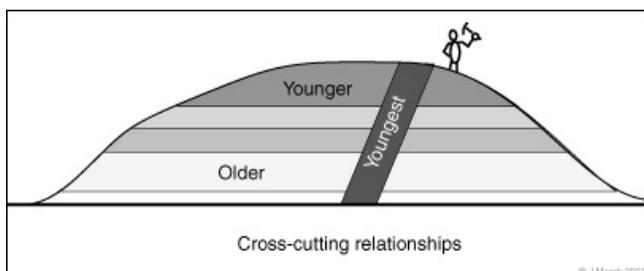


FIGURE 5 [HTTPS://WWW.GEOL.UMD.EDU/~JMERCK/GEOL100/LECTURES/03.HTML](https://www.geol.umd.edu/~jmerck/geol100/lectures/03.html)

## STRATIGRAPHY



FIGURE 6 [HTTPS://AUSTRALIANMUSEUM.NET.AU/LEARN/MINERALS/SHAPING-EARTH/](https://australianmuseum.net.au/learn/minerals/shaping-earth/)

### 5. Law of Inclusions

this law states that rock fragments (in another rock) must be older than the rock containing the fragments.

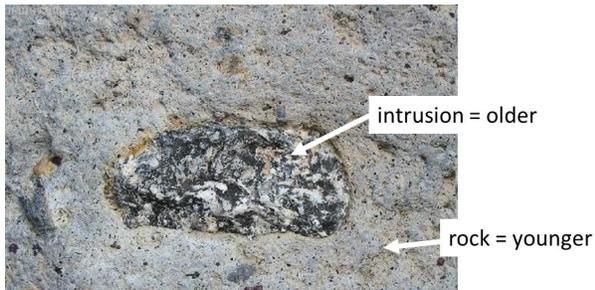


FIGURE 7 [HTTP://GEOLOGYLEARN.BLOGSPOT.COM/2015/05/GEOLOGIC-PRINCIPLES-FOR-DENING-RELATIVE.HTML](http://geologylearn.blogspot.com/2015/05/geologic-principles-for-dening-relative.html)

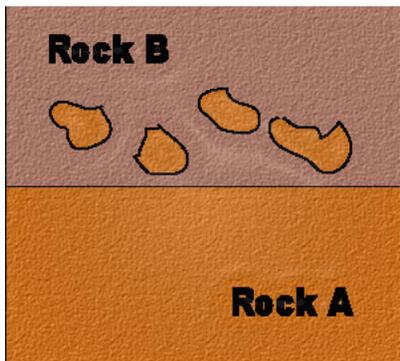


FIGURE 8 [HTTPS://IMNH.IRI.ISU.EDU/EXHIBITS/ONLINE/GEO\\_TIME/GEO\\_PRINCIPLES.HTM](https://imnh.iri.isu.edu/exhibits/online/gEO_TIME/GEO_PRINCIPLES.HTM)

### 6. Law of Faunal Succession

This law was developed by William "Strata" Smith who recognized that fossil groups were succeeded by other fossil groups through time. This allowed geologists to develop a fossil stratigraphy and provided a means to correlate rocks throughout the world.

# STRATIGRAPHY

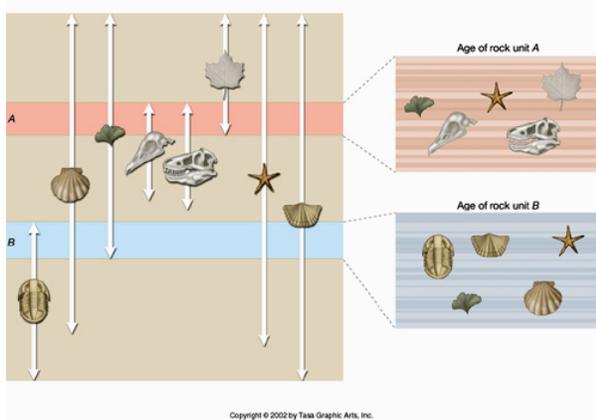


FIGURE 9 [HTTPS://IMNH.IRI.ISU.EDU/EXHIBITS/ONLINE/GEO\\_TIME/GEO\\_PRINCIPLES.HTM#FAUNAL](https://imnh.iri.isu.edu/exhibits/online/gEO_TIME/GEO_PRINCIPLES.HTM#FAUNAL)

## STRATIGRAPHY

### Bibliography

- **Brookfield, M.F.,2004.** Principles of Stratigraphy. Blackwell Publishing, 340P.
- **North American Stratigraphic Code. , 2005.** AAPG Bulletin, v. 89, no. 11, pp. 1547–1591.

**Mail, A.D., (2010),** The Geology of Stratigraphic Sequences, 2nd Edition, Springer, 522P.