— University of Mosul —
College of Petroleum & Mining Engineering

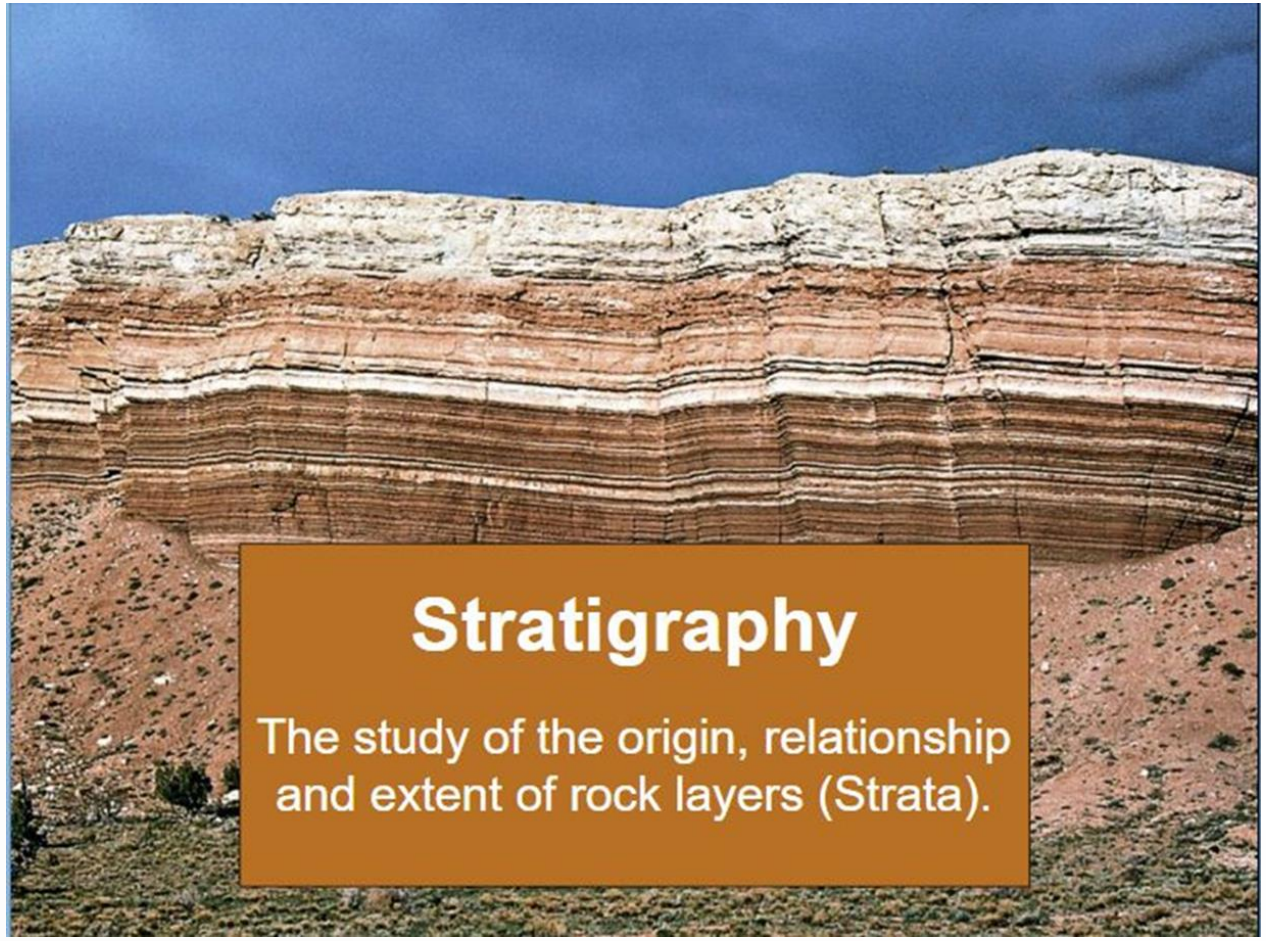
General Geology2

Lecture 3

Prof. Dr. Majid Majdi Al-Mutwali

Petroleum and Refining Engineering Department

Email: majidmutwaly@uomosul.edu.iq



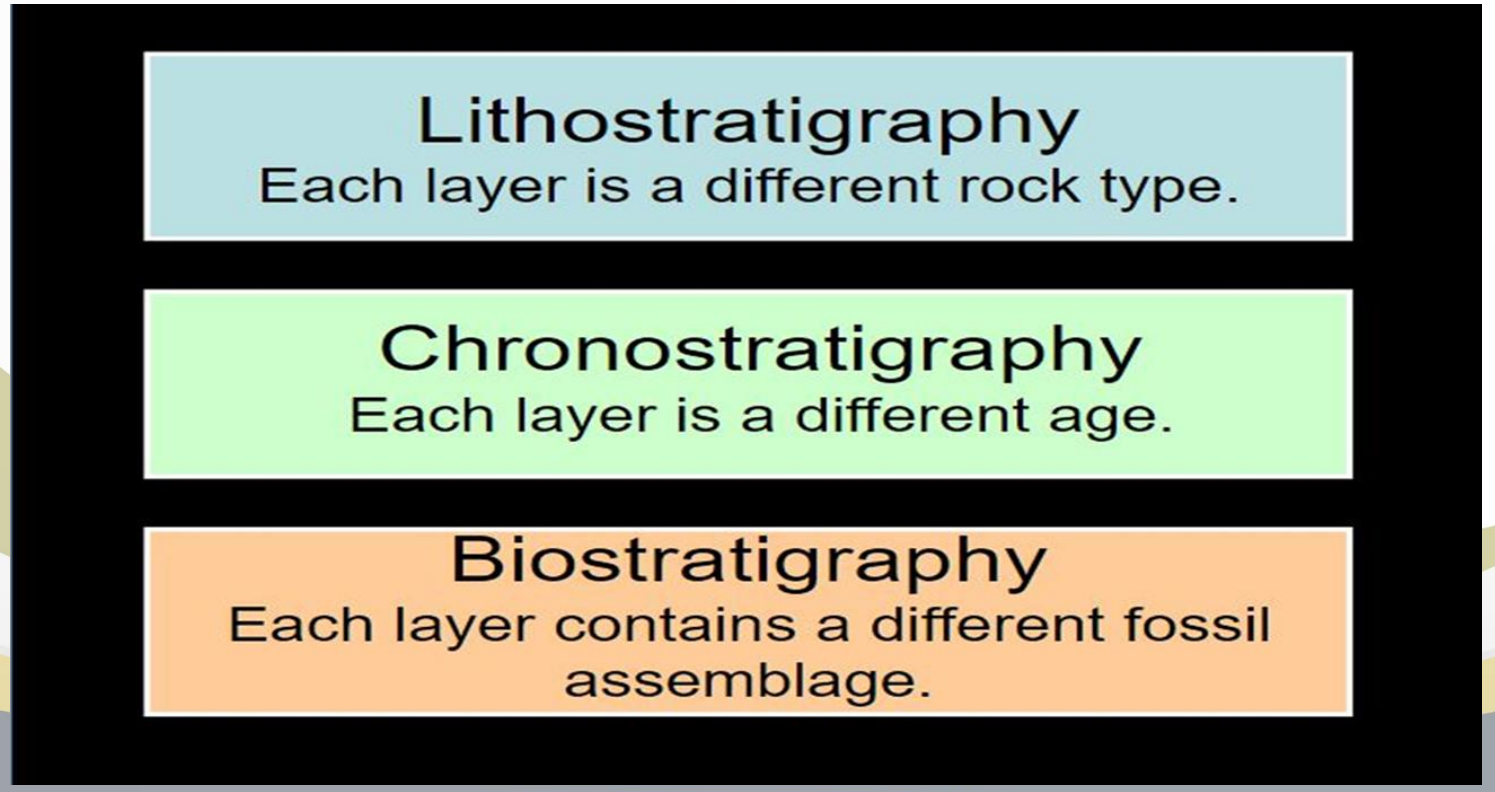
Stratigraphy; Reading the Pages of Earth History

Stratigraphy is a branch of geology concerned with the study of rock layers (strata) and layering (stratification). It is primarily used in the study of sedimentary and layered volcanic rocks.

Stratigraphy

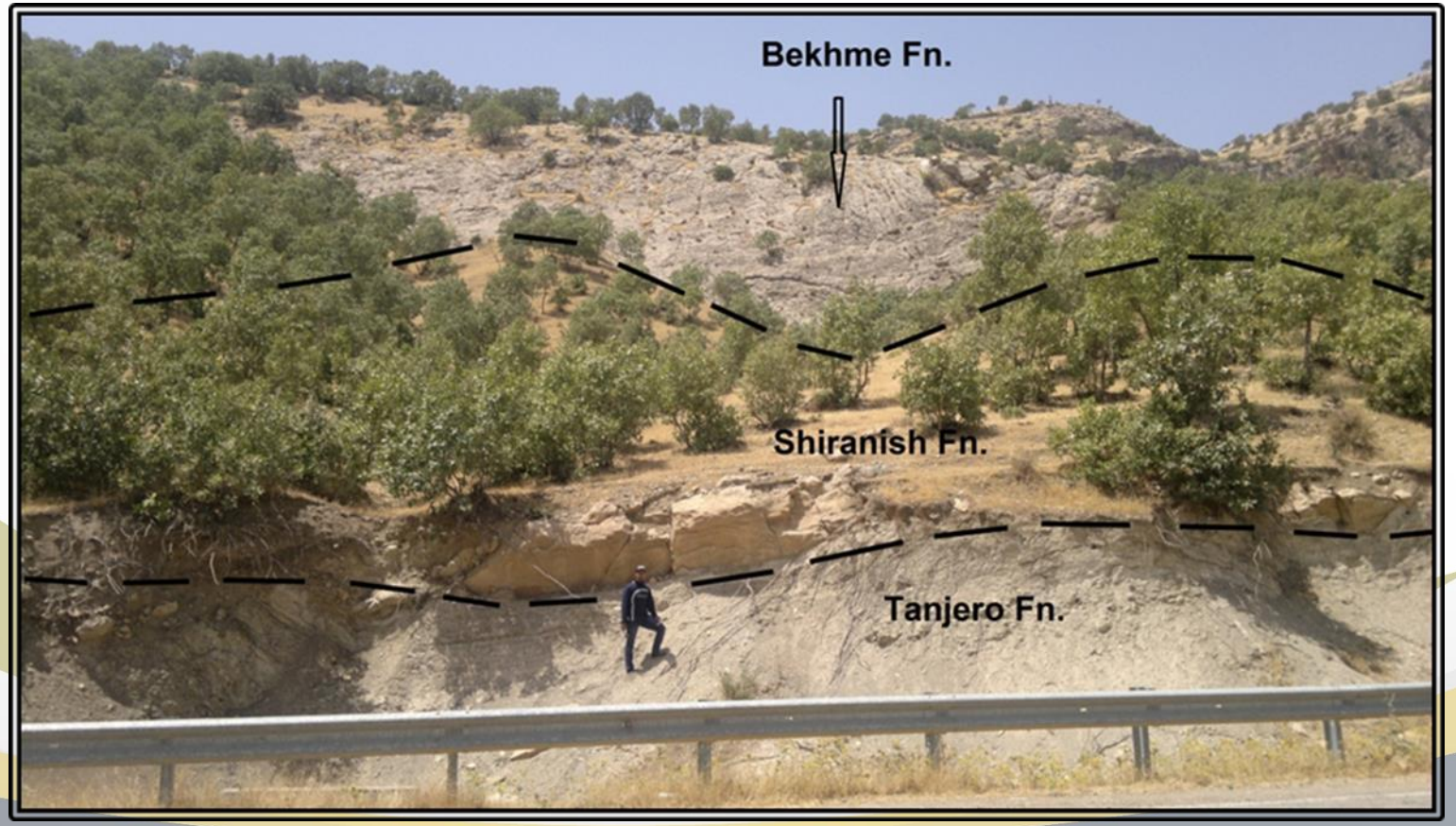
The arrangement of rocks in layers or strata. the branch of geology dealing with the study of the nature, distribution, and relations of the stratified rocks of the earth's crust.

وهو العلم الذي يختص بدراسة الصخور المتطبقة اي على شكل طبقات وتدرس من ناحية طريقة تكوينها اي بيئة الترسيب وتوزيعها الجغرافي والزمني وتعاقبها ومضاهاتها مع الطبقات الاخرى اضافة الى تقسيمها الى وحدات طباقية . ان اصل كلمة Stratigraphy مكونة من مقطعين المقطع الأول Stratumلاتينية وتعني طبقة والمقطع الثاني Graphy اغريقية وتعني الوصف بشكل نظامي . ان اساس هذا العلم ينطبق على الصخور التي تكون على شكل طبقات لذلك فأن الصخور الرسوبية هي المادة الأساسية لتطبيقات هذا العلم , وكذلك اي صخور تكون بشكل طبقات سواء كانت نارية اومتحولة.



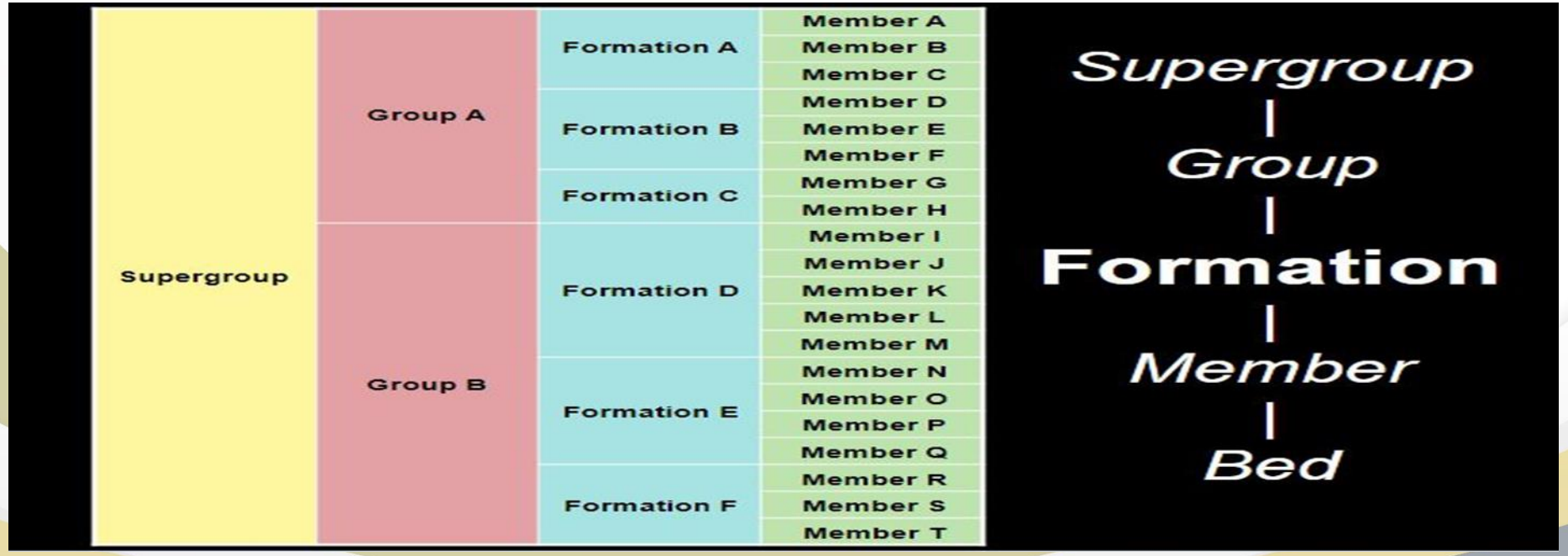
lithostratigraphic unit is a stratum or body of strata, generally layered, that conforms to the Law of Superposition and is distinguished and delimited on the basis of lithic characteristics and stratigraphic position.

Formation is a fundamental unit of lithostratigraphy that represents a distinct layer or sequence of rock that has a recognizable and consistent set of physical characteristics, such as rock type, texture, or fossil content. A formation is large enough to be mapped and is usually named after a geographic location where it is prominently exposed (e.g. Tanjero Formation , Shiranish Formation, Bekhmae Formation). Formations can vary in thickness and are typically the basic building blocks used to describe the geological history of an area.



Lithostratigraphic units are divided into a hierarchy based on the scale and distinctiveness of rock layers. These units help geologists categorize and map rock formations. The primary divisions, from largest to smallest, are:

1. **Supergroup**: A collection of related groups of rock strata that share significant geological characteristics.
2. **Group**: A collection of formations that share certain features or are related by a common geological history.
3. **Formation**: The fundamental unit in lithostratigraphy. It consists of a distinct layer or series of layers with recognizable and consistent lithological characteristics.
4. **Member**: A smaller, more specific subdivision within a formation. It represents a distinct layer or set of layers within the formation.
5. **Bed**: The smallest recognizable unit in lithostratigraphy, representing a single layer of rock or sediment. Beds are often used to describe fine-scale features, such as specific sedimentary layers within a member. **These units allow for the detailed classification and correlation of rock layers across regions.**



Requirements for Formally Named Geologic Units:

Naming, establishing, revising, redefining, and abandoning formal geologic units require publication in a recognized scientific medium of a comprehensive statement, which includes

(i) intent to designate or modify a formal unit
(ii) designation of category and rank of unit
(iii) selection and derivation of name
(iv) specification of stratotype (where applicable)
(v) description of unit
(vi) definition of boundaries
(vii) historical background
(viii) dimensions, shape

and other regional aspects

(ix) geologic age
(x) correlations

These requirements apply to subsurface and offshore, as well as exposed units

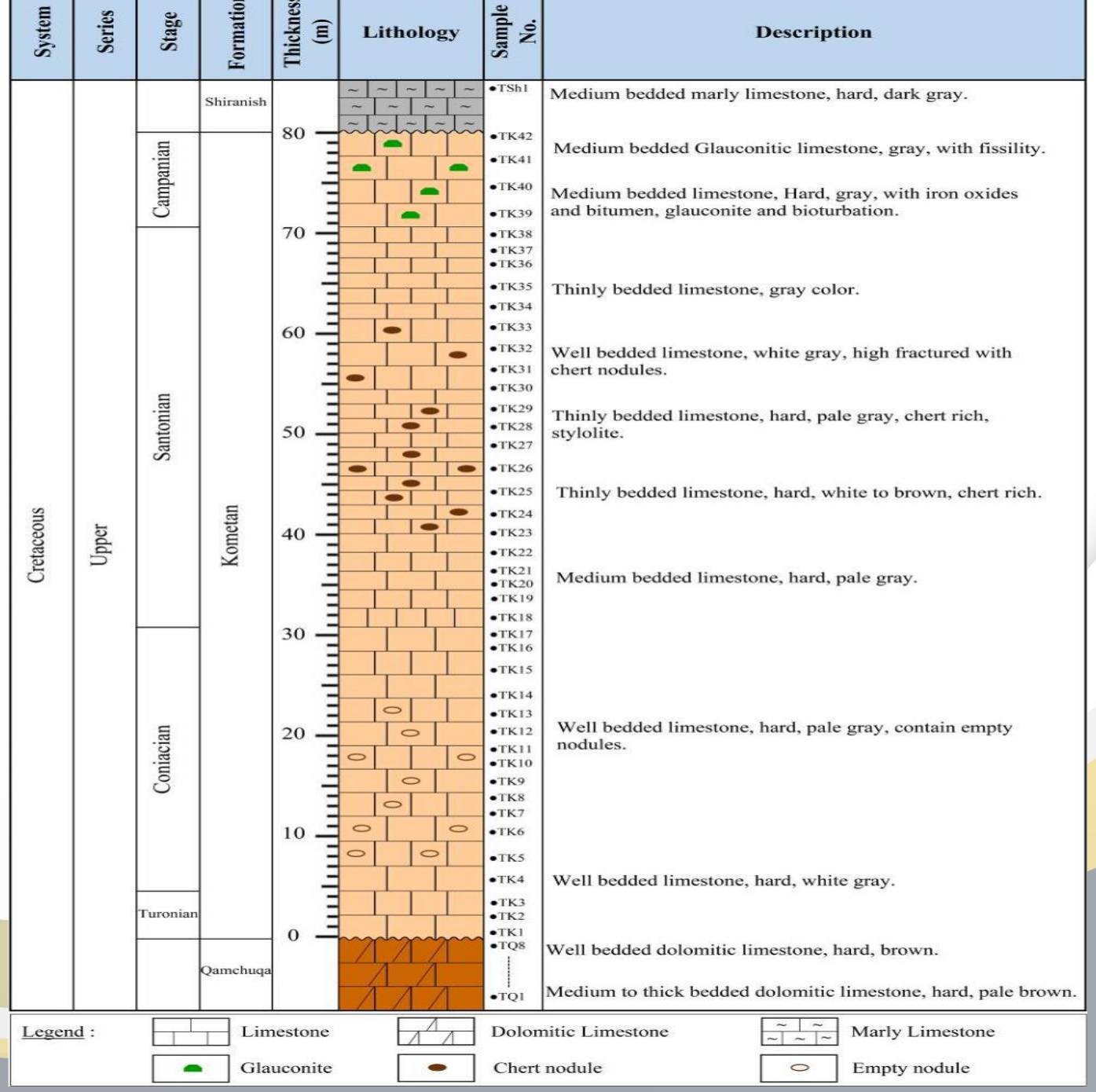
How do we Illustrate Stratigraphy?

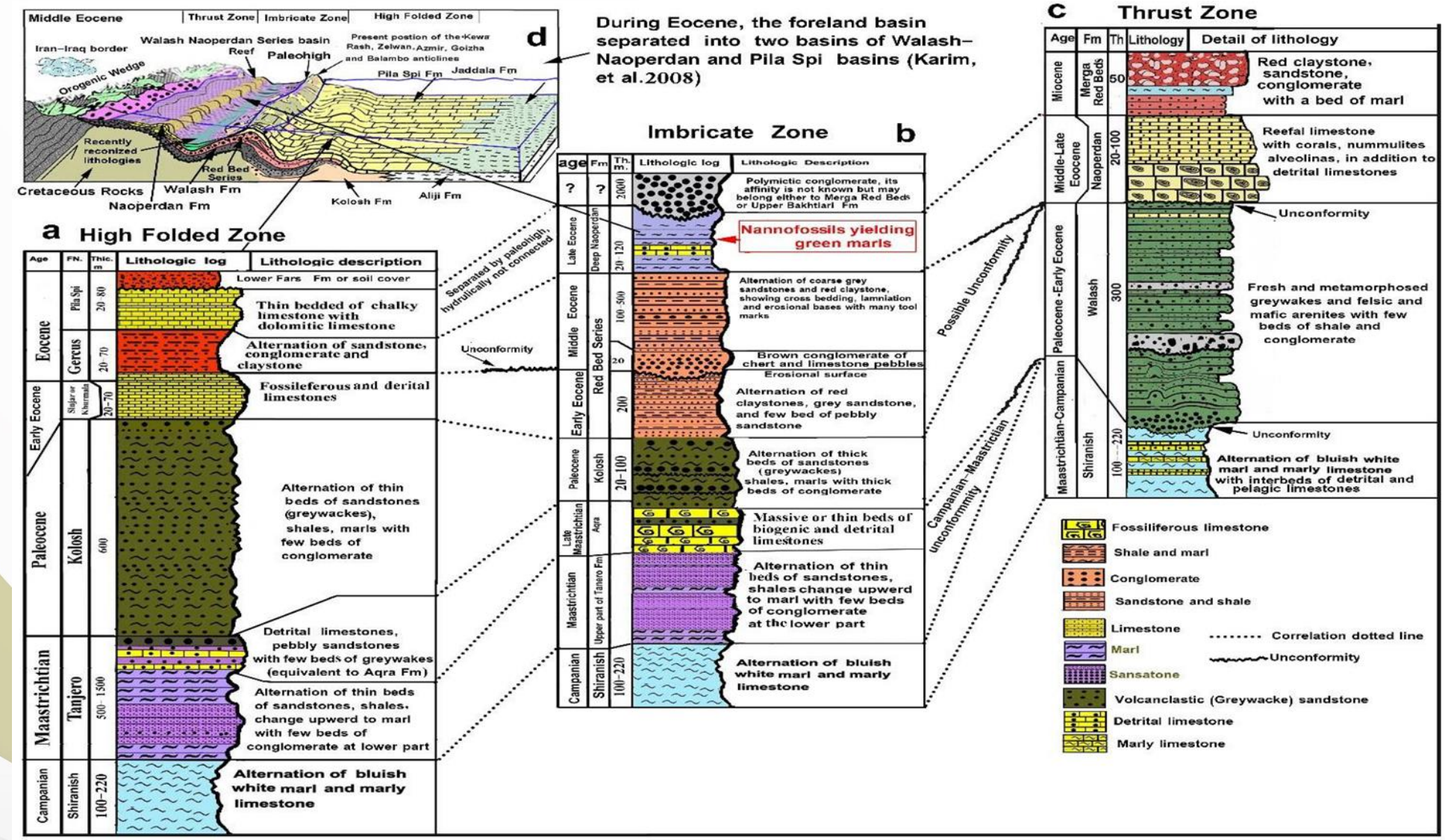
Stratigraphy is typically illustrated using a stratigraphic column or stratigraphic section, which visually represents the layers of rock and their relationships in a vertical sequence. Here are some common methods to illustrate stratigraphy:

- Stratigraphic Columns
- Cross Sections
- Geologic Maps

Each method allows geologists to communicate the sequence, composition, and history of rock layers in an easily interpretable visual format.

lithologic section of the Kometan Formation in Tabin section

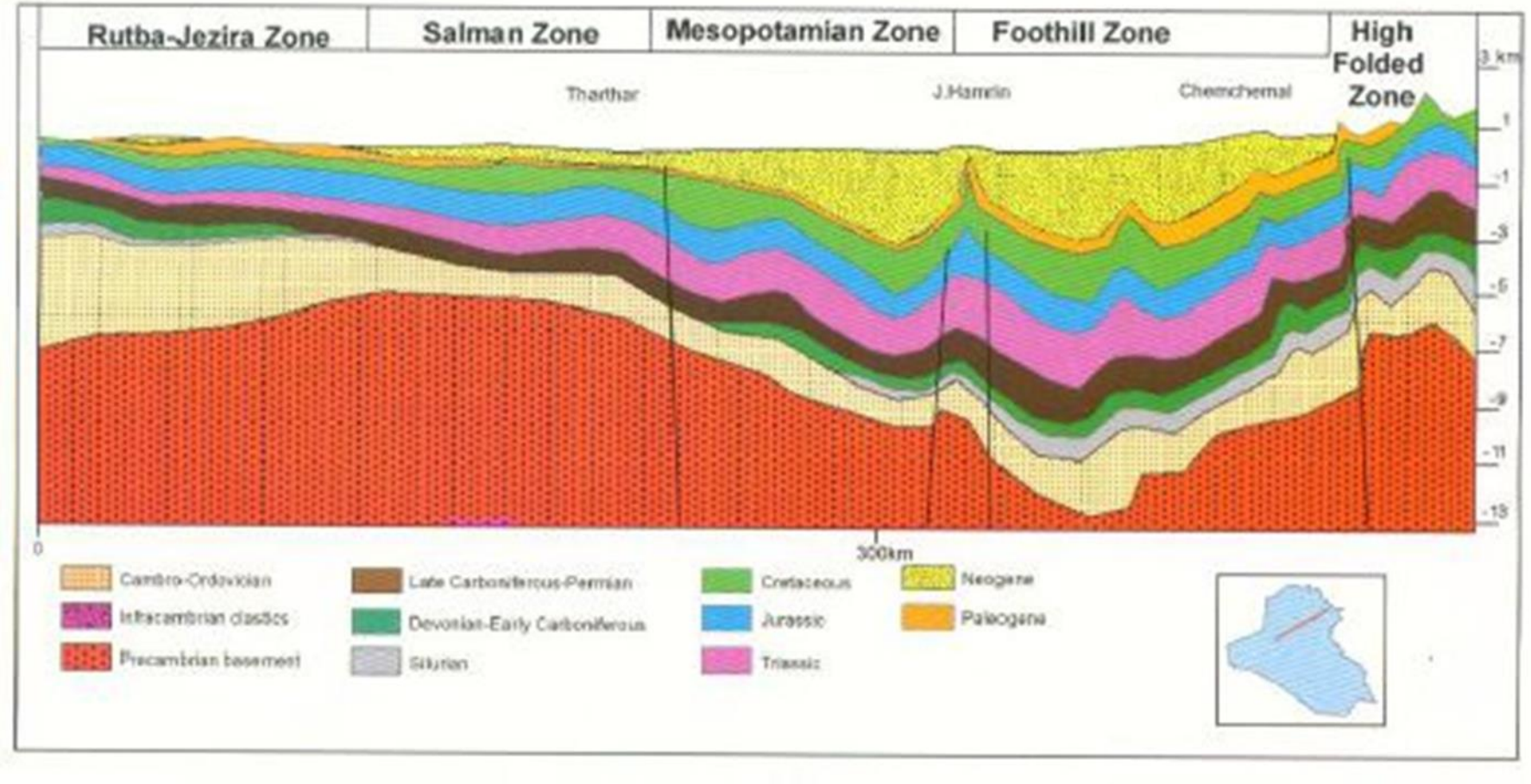




1. Stratigraphic Column: A vertical diagram showing different layers of rock, arranged from oldest at the bottom to youngest at the top. Each layer (formation, member, or bed) is represented by a block or band, with its thickness proportional to the actual thickness of the rock. The lithological characteristics of each layer, such as rock type (sandstone, shale, limestone), are often indicated using standard symbols, textures, or patterns.

Correlation Diagrams :These diagrams show how rock layers (formations, members) correlate across different geographic regions. It illustrates the equivalency of rock units across distances

2. Cross-Section: A geological cross-section is a side view (cut-away) of a region showing the arrangement of rock layers beneath the surface. It illustrates the relationships between different strata, faults, folds, or other geological structures. It is often used to show how layers tilt, fold, or are disrupted by faults.



Cross section through Central Iraq

Geological maps are specialized maps that represent the distribution, nature, and age of rock formations and other geological features at the Earth's surface. These maps are essential tools for geologists and other earth scientists, helping them to understand the composition and structure of an area