Cretaceous Peroid (K) (79 my)

Late (K2):

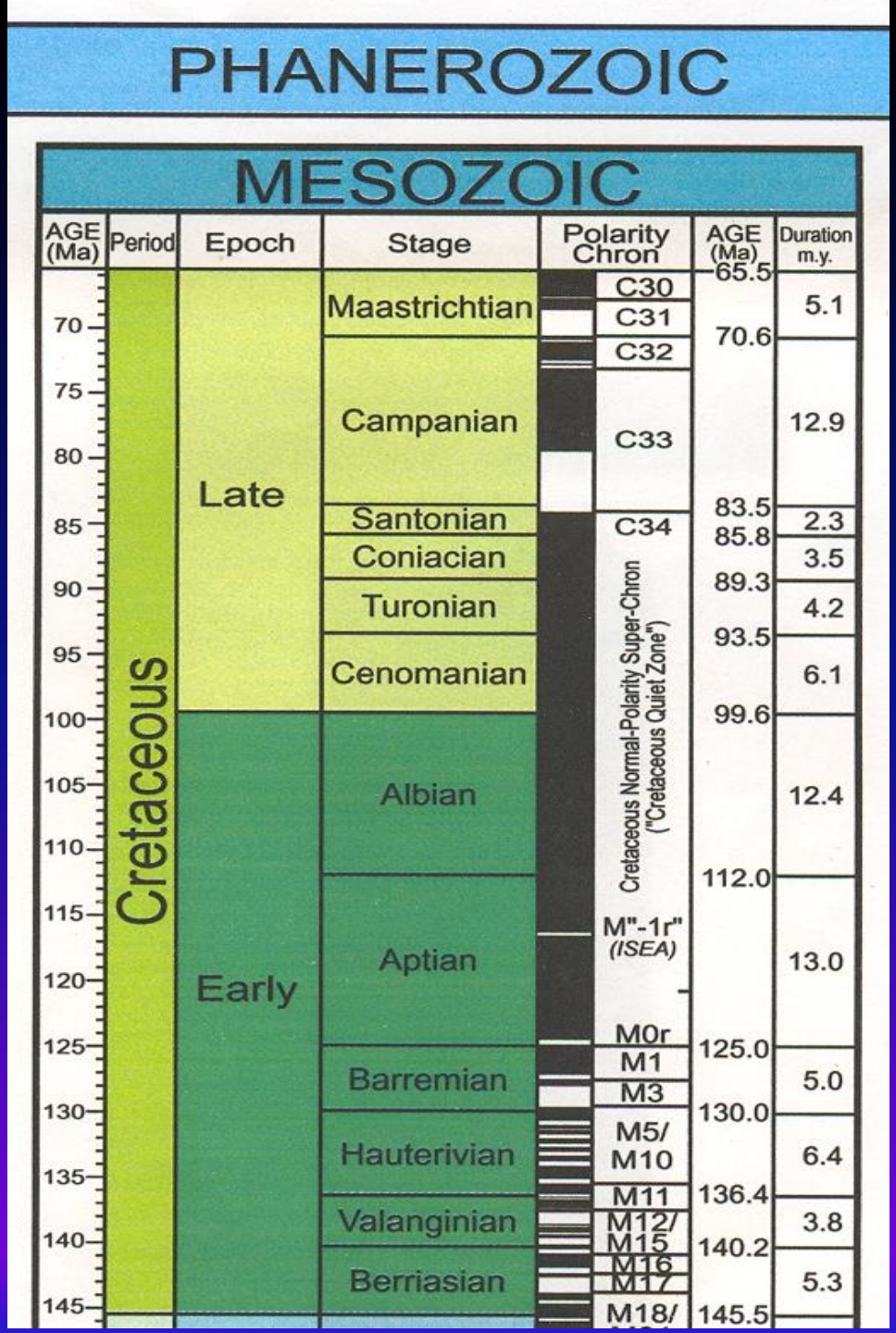
- Maastrichtian
- Campanian
- Santonian
- Coniacian

Senonian

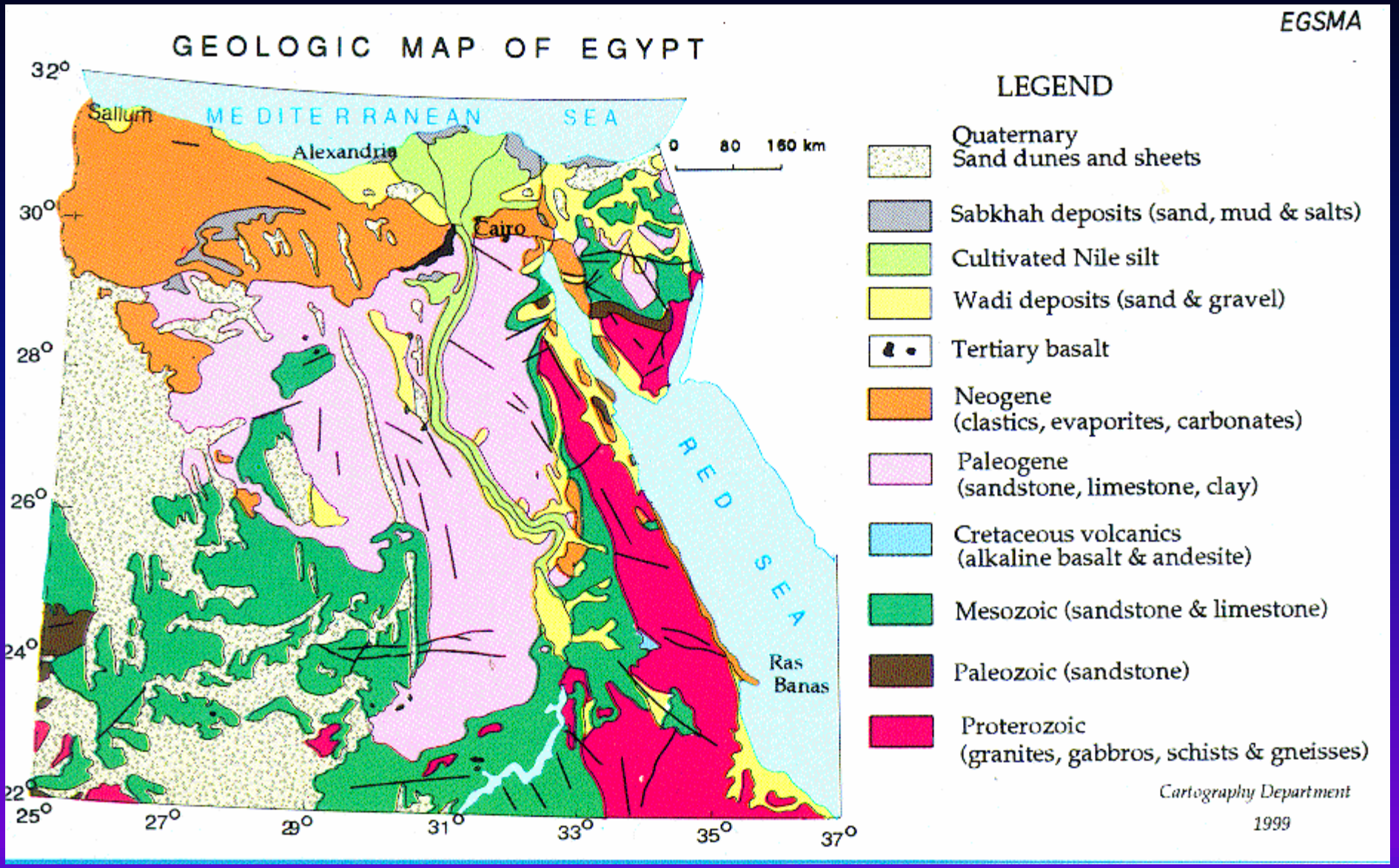
- Turonian
- Cenomanian

Early (K1):

- Albian
- Aptian
- Barremian
- Neocomian



Stratigraphy of the Cretaceous deposits in Egypt



Cretaceous rocks cover about 40% of the surface of Egypt.

- **Western Desert:** *Area from the southern borders with Sudan to all the Oases Kurkur, Dungul, Kharga, Farafra and Bahariya, as well as the isolated structure of Gabal Abu Roash.*
- **Nile Valley:** *bordering both sides of the valley between Aswan and Qena.*
- **Eastern Desert**: *outcropping east of Aswan, Wadi Qena, the two Galalas, Gabal Ataqa and Gabal Shabraweet.*
- **Red Sea Coast:** *outcropping at the Esh Mellaha Range, in the Qusier-Safaga district and as scattered patches near Shalateen.*
- **Sinai:** *covering most of the central plateaus and a great part of the northern structures.*

Cretaceous Events

The Cretaceous Period comprises four transgressive cycles in Egypt (According to Said 1990).

- The three Aptian, Cenomanian and Coniacian cycles brought very shallow seas and the deposition of marginal marine sediments of intertidal, supratidal, estuarine and swamp environments that are frequently alternating with alluvial sediments.

- The fourth Campanian-Maastrichtian transgression, brought shallow open marine conditions to large parts of Egypt.

Main Cretaceous Facies

- North Egypt: (relatively deeper water conditions) limestone and chalk throughout the whole Cretaceous period.
- Central Egypt: (at the latitude of Qena and southward) Cretaceous deposits are represented by alternated limestones, marls, shales, phosphorites and sandstones.
- Southern Egypt: Sandstones of "Nubian“ facies is the equivalent of the Cretaceous carbonates.

الإمام الشافعي

The Lower Cretaceous

a) Mallha Formation (Abdallah *et al.* (1965)
(Western side of the Gulf of Suez and central Sinai)

b) Risan Aneiza Formation (SAID 1971)
Northern Sinai – Maghara

D) In the southern part of the Western Desert, two rock units were recognized in the former "Nubia Sandstone“: Sabaya and Abu Ballas formations

D- Subsurface of the Western Desert (Barakat 1982):) Betty and Burg El Arab formations

a) Mallha Formation (Abdallah *et al.* (1965)
(Western side of Gulf of Suez and central Sinai)

- **Type locality:** Wadi Malha and Wadi Um Galawat at the southeastern cliffs of the Northern Galala and ranges.
- **Thickness:** 70-130 m,
- **Boundaries:** disconformably overlying Qiseib red beds of Permo-Triassic age.
- **Lithology:** Red-grey, fine-coarse grained partly kaolinitic sandstones and siltstones. The formation contains conglomeratic beds in the lower part and stringers of pebbles high in the section.
- The Malha Fm yields large quantities of kaolin deposits in the form of beds or irregular lenses.
- It is well exposed along the southern Tih scarp in W-central Sinai.

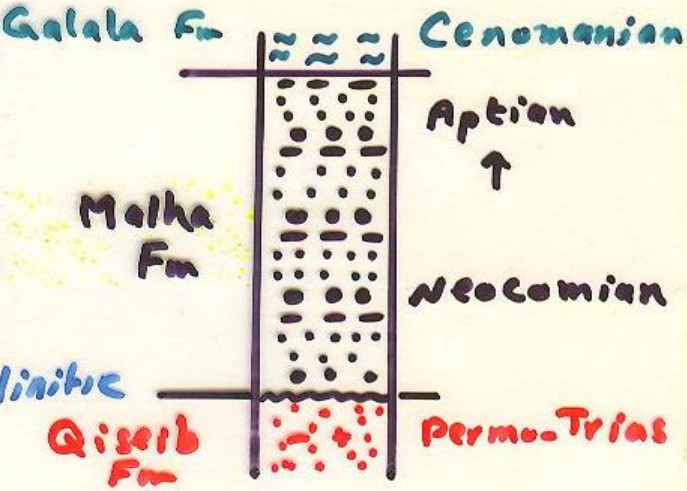
The Lower Cretaceous:

a) The Gulf of Suez region:

Malha Formation (Abdallah et al. 1965)

- Wadi Malha, SE Northern Galala
- 70–150 m thick
- alternation of multicoloured cross- and graded bedded sandstone and shales with economic kaolinitic clays "interbeds"
- overlain by marine Cenomanian strata "Galala" Fm
- yielded plant remains and palynomorphs of neocomian-Aptian age.
- In Sinai, it is well exposed along the southern Tih scarp; G. Musaba Salama, W. El-Hommr, G. Iseila, G. Dehiessa, etc., yielded kaolinitic clays used for ceramics, paper, white portland cement, rubber, paints, drugs industries.
- Alex Ceramic Co. & Sinai Mn Co. (exportation)

Kaolin + glass sands + gypsum = white cement



b) Risan Aneiza Formation (SAID 1971)
Northern Sinai – Maghara

- **Type locality:** ***Northern flanks of the structure at Bir Lagama,***
- **Thickness:** ***110-230 m***
- **The lowest calcareous sandstone bed of the section carries the Aptian *Orbitolina lenticularis.* The oolitic ferruginous limestone bed of the upper part of the section carries *Knemiceras* sp., *Douvilleceras mammilatum* and the pectinid *Nithea syriaca* of Early Albian age**

b) Northern Sinai folded region:

G. Maghara, Risan Aneiza, Bir Lagama, G. Manzour, G. Halal, etc.

Risan Aneiza Formation (Said 1971):

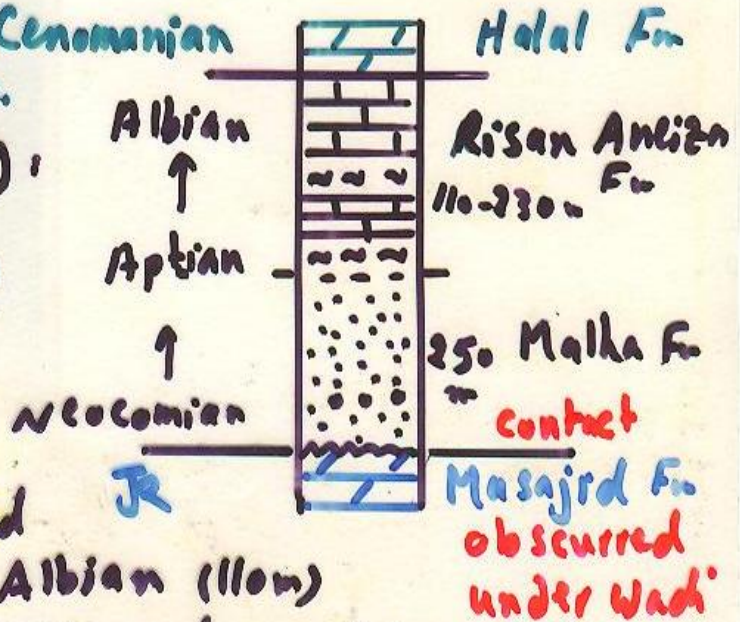
Halal Fm ≡ White Compact limestone "base Cenom"

Risan Aneiza Fm ≡ { Yellow brown sandy orbitoidal oolitic limestone with Orbitolina lenticularis and Knemiceras sp. → Aptian-Albian (110m)

Malha Fm ≡ Sandstone, Barremites sp. Varicoloured, poorly fossiliferous (250m)

contact obscurred

Masajid Fm Late Jurassic



C) In the southern part of the Western Desert, two Lower Cretaceous rock units were recognized in the former "Nubia Sandstone“

-**The Sabaya Formation** is a brown sandstone succession (100 m thick) with trace fossils and palaeosoils of Albian age (KORA *et al.*1988)

- **The Abu Ballas Formation** is a white fluviatile sandstone (80 m) with thin *Lingula* Shale marine horizon of Aptian age . It is equivalent to the Abu Simbel Formation in the Nile Valley and to Selima Formation in northern Sudan (KLITZSCH & LEJAL-NICOL 1984)

d) The South Western Desert outcrops :

- Darb El-Arbain - Aswan - Abu Simbel "Toshka area"
- Part of the Nubia Sandstone (Issawi 1971)
- Klitzsch & Lejal-Nicol (1984)

Maghrabi Fm (Cenom.) = Burg Fm GSE

* **Sabaya Fm** : brown sandstones with paleosoils and trace fossils → Albian ≈ 100m

  Gulu Sabaya "Dakhla"

* **Abu Ballas Fm** : white cross bedded fluviatile sandstones with Lingula Shale "marine" horizon → Aptian ≈ 80m

  between Dakhla and Gilf Kebir

  equivalent to Abu Simbel Fm in Nile Valley and to Selima Fm in Northern Sudan

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Economic aspects :

- huge kaolin deposits are produced from the Malha Fm in the Gulf of Suez
- oil is produced from Burg El-Arab Fm in the north Western Desert

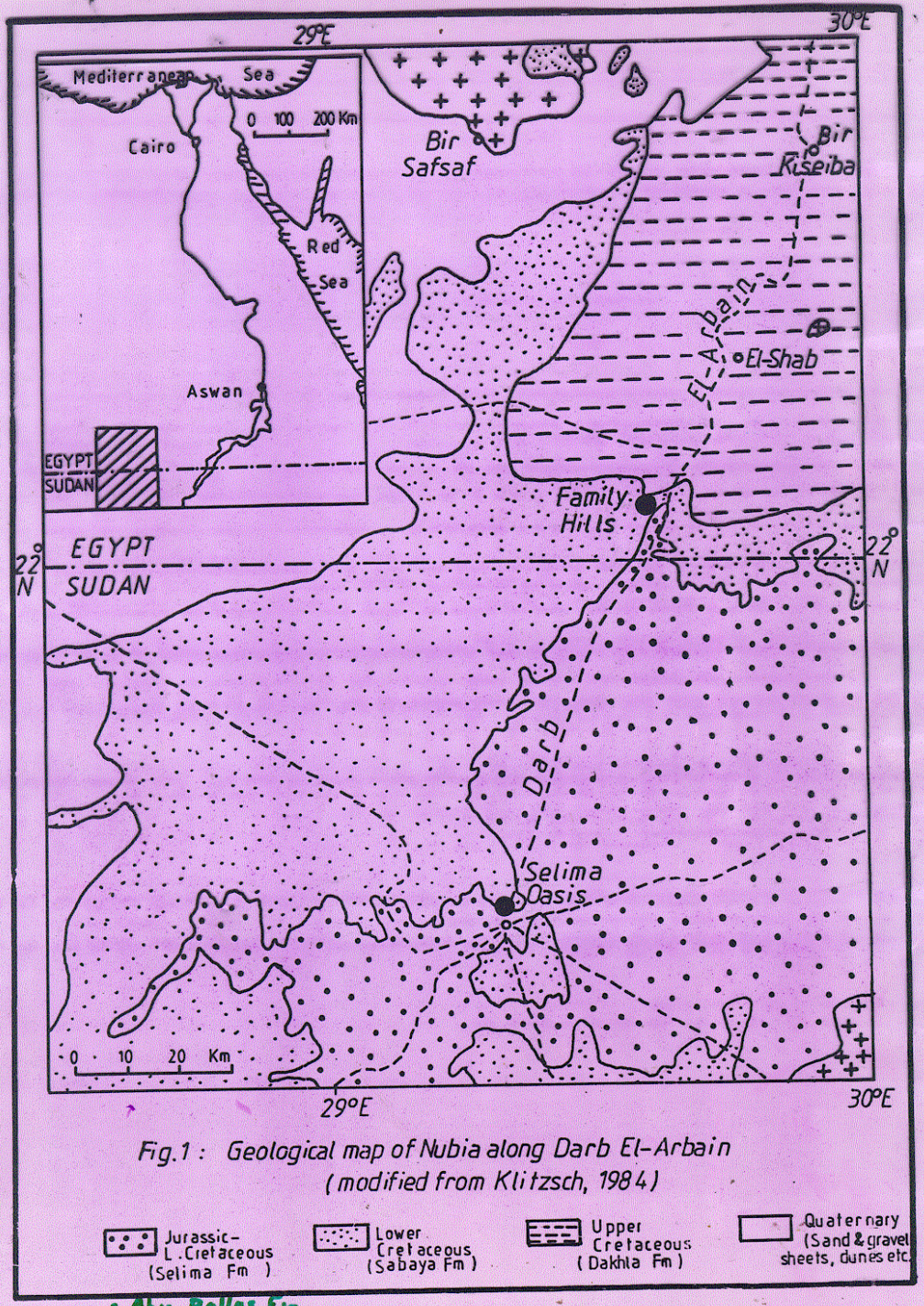
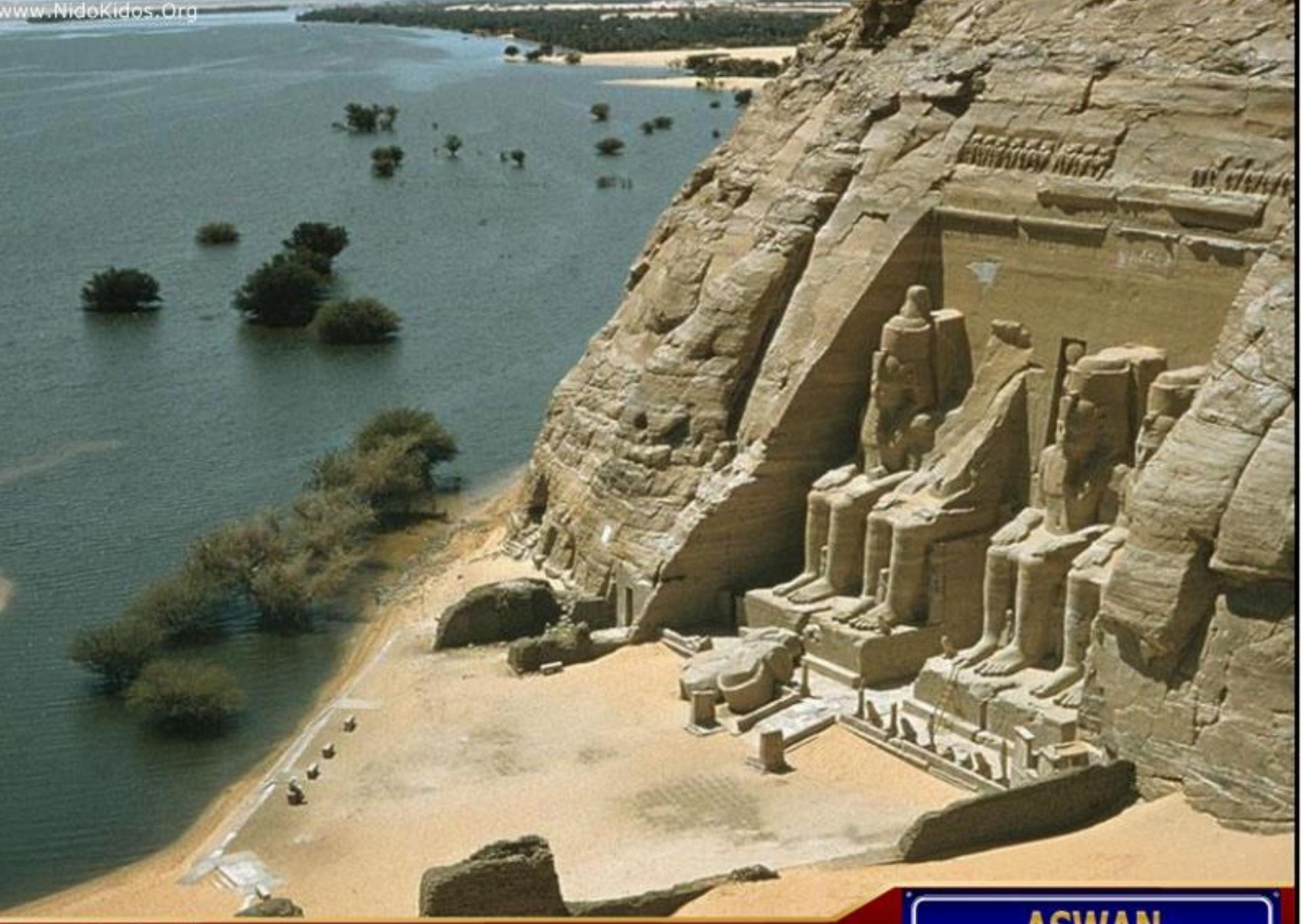


Fig.1 : Geological map of Nubia along Darb El-Arbain (modified from Klitzsch, 1984)

+ Abu Ballas Fm



Abu Simbel Temple

ASWAN

D- Subsurface of the Western Desert (Barakat 1982)

i) Betty Formation (130 m thick in type section):

It forms the basal Cretaceous unit in the north Western Desert and dates to the Barremian-Neocomian. Lithostratigraphically, it is composed of varicoloured shales and siltstones overlying thick massive sandstones, sub rounded, slightly indurate and poorly porous. In some places poorly preserved pollen and spores are reported indicating a shallow neritic to lagoon environment.

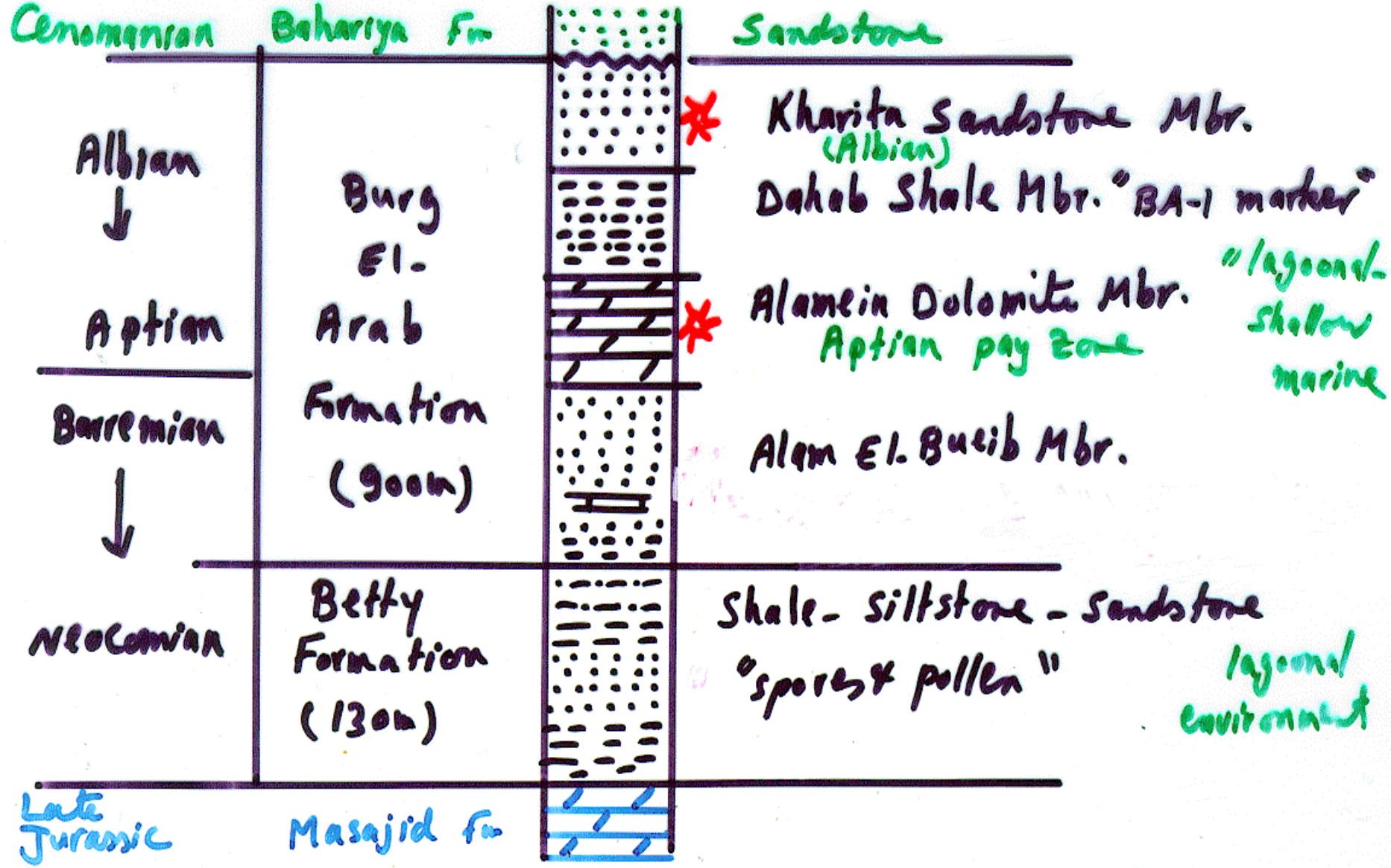
- **ii) Burg El Arab Formation** (900 m thick in type section):

  This formation is composed of continental, estuarine lagoonal to marine massive beds of sandstone with shale, limestone and dolomite interbeds. It ranges in age from Albian to Barremian-Neocomian. It is subdivided into four members:

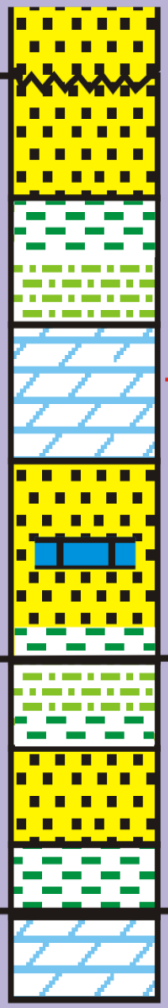
  - **Kharita* Member (Albian)**
  - **Dahab Shale Member or BA-1 marker (Aptian),**
  - **Alamein Dolomite* Member (Aptian), and**
  - **Alam El Bueib Member* (Barremian-Neocomian).**
- Among these members, the Alamein Dolomite and the Kharita members are oil payzones in the north Western Desert.

c) Subsurface of north Western Desert: "Barakat 1982"

Working oil companies classification



C) Subsurface of north Western Desert. (Barakat 1982)
working oil companies classification



Cenomanian	Bahariya Fm	Sandstone	
Albian ↓ Aptian	Burg El-Arab Formation (900 m)	Kharita Sandstone Mbr. (Albian) Dahab Shale Mbr:"BA-1 marker" Alamein Dolomite Mbr. Aptian pay zone	Lagonal shallow marine
Barremian ↓ Neocomian		Alam El-Bueib Mbr. Gas-Qasr	
	Betty Formation (130 m)	Shale-siltstone-sandstone "spores & pollen"	Lagoonal environment
Late Jurassic	Masajid Fm		