



PALEONTOLOGY

<http://www.biltek.tubitak.gov.tr/bilgipaket/jeolojik/index.htm>

Muhittin Görmüş
Department of Geology

Lecture 14



ANKARA UNIVERSITY



Applications

Sandstones: *Arca* sp. *Chlamys* sp. *Exogyra* sp. *Nummulites* sp.
Assilina sp. *Quinqueloculina* sp.

Thick bedded lmst. : *Ostrea* sp. *Chlamys* sp.
Inoceramus sp. *Orbitoides apiculatus*, *Loftusia* sp.
Quinqueloculina sp.

Alluvium

Thin to medium bedded lmst.: Rich
fusulins, *Schwagerina* sp.

QUESTION: Please find ages of stratigraphical units and interpretate their paleoenvironments



ÜST ZAMAN	ZAMAN	DEVİR	DEVRE	MİLYON YIL	
FANEREOZYOİK	SENOZOYOİK	KUVATERNER	HOLOSEN	0.8	
			PLEYİSTOSEN	1.8	
		TERSİYER	NEOJEN	PLİYÖSEN	5
				MİYOSEN	25
				OLİGOSEN	40
			PALAJOJEN	EOSEN	65
				PALEOSEN	65
		MESOZOYOİK	KRETASE	ÜST	100
				ALT	140
			JURA	MALM	160
	DOGGER			180	
	LİYAS			200	
	TRİAS		ÜST		
			ORTA		
	PALEOZOYOİK	PERMİYEN	ÜST		
			ALT	280	
		KARBONİFER	ÜST		
ALT			350		
DEVONİYEN		ÜST			
		ORTA			
		ALT	400		
SİLÜRİYEN		ÜST			
		ALT	430		
ORDOVSİYEN		ÜST			
	ALT	500			
KAMBRIYEN	ÜST				
	ORTA				
	ALT	570			
PRETEREZOYOİK	PREKAMBRIYEN	ALGONKİYEN		2 600	
KRİPTOZOYOİK ARKEOZOYOİK AZOYOİK		ARKEEN		2 600 den önce	

Arca sp.

Chlamys sp.

Exogyra sp.

Nummulites sp.

Assilina sp.

Quinqueloculina sp.

Ostrea sp.

Chlamys sp.

Inoceramus sp.

Orbitoides

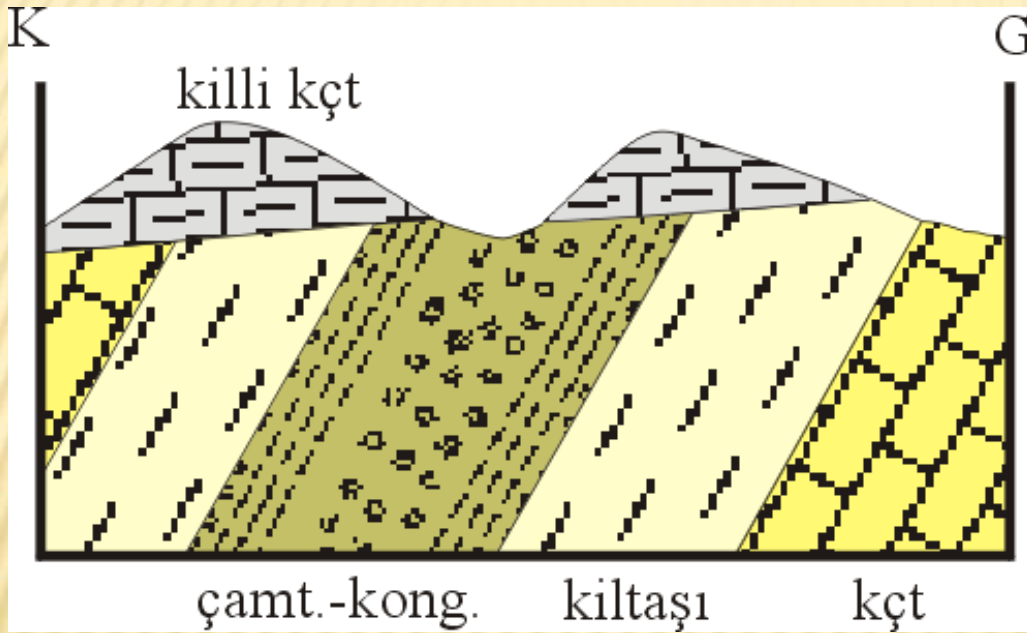
apiculatus,

Loftusia sp.

Quinqueloculina sp.

Fusulinler

Schwagerina sp.



Limestone: *Loftusia* sp.,
Orbitoides sp., *Triloculina* sp.,
Algae

Claystone: *Globo truncana* sp.,
Heterohelix sp.,

Mudstone-Sandstone: at the
lower part; *Globegerina* sp.
(rich), at top; *Nummulites* sp.,
Assilina sp., *Peneroplis* sp.

Clayey limestone: *Miogypsina*
sp., *Lepidocyclina* sp.,



QUESTION: Please find ages of stratigraphical units and interpretate their paleoenvironments and structural geology.

Aging

ÜST ZAMAN	ZAMAN	DEVİR	DEVRE	MİLYON YIL	
FANEREOZYOİK	SENOZOYOİK	KUVATERNER	HOLOSEN	0.8	
			PLEYİSTOSEN	1.8	
		TERSİYER	NEOJEN	PLİYOSEN	5
				MİYOSEN	25
				OLİGOSEN	40
				EOSEN	65
			PALAEOJEN	PALEOSEN	65
				ÜST	100
				ALT	140
				MESOZOYOİK	KRETASE
	DOGGER	180			
	JURA	LİYAS	200		
		ÜST			
	TRİAS	ORTA			
		ALT	230		
	PALEOZOYOİK	PERMİYEN	ÜST		
			ALT	280	
		KARBONİFER	ÜST		
ALT			350		
DEVONİYEN		ÜST			
		ORTA			
SİLÜRİYEN		ALT	400		
		ÜST			
ORDOVİSYEN		ALT	430		
		ÜST			
KAMBRIYEN	ALT	500			
	ÜST				
PRETEREZOYOİK	PREKAMBRIYEN	ALGONKİYEN	2 600		
		ARKEEN	2 600 den önce		

Loftusia sp.,
Orbitoides sp.,
Triloculina sp.,

Algea

Globotruncana sp.,
Heterohelix sp.,

Globogerina sp.,
Nummulites sp.,
Assilina sp.,
Peneroplis sp.

Miogypsina sp.,
Lepidocyclina sp.,

When overlaps are taken into considerations, the following ages are attributed to the units:

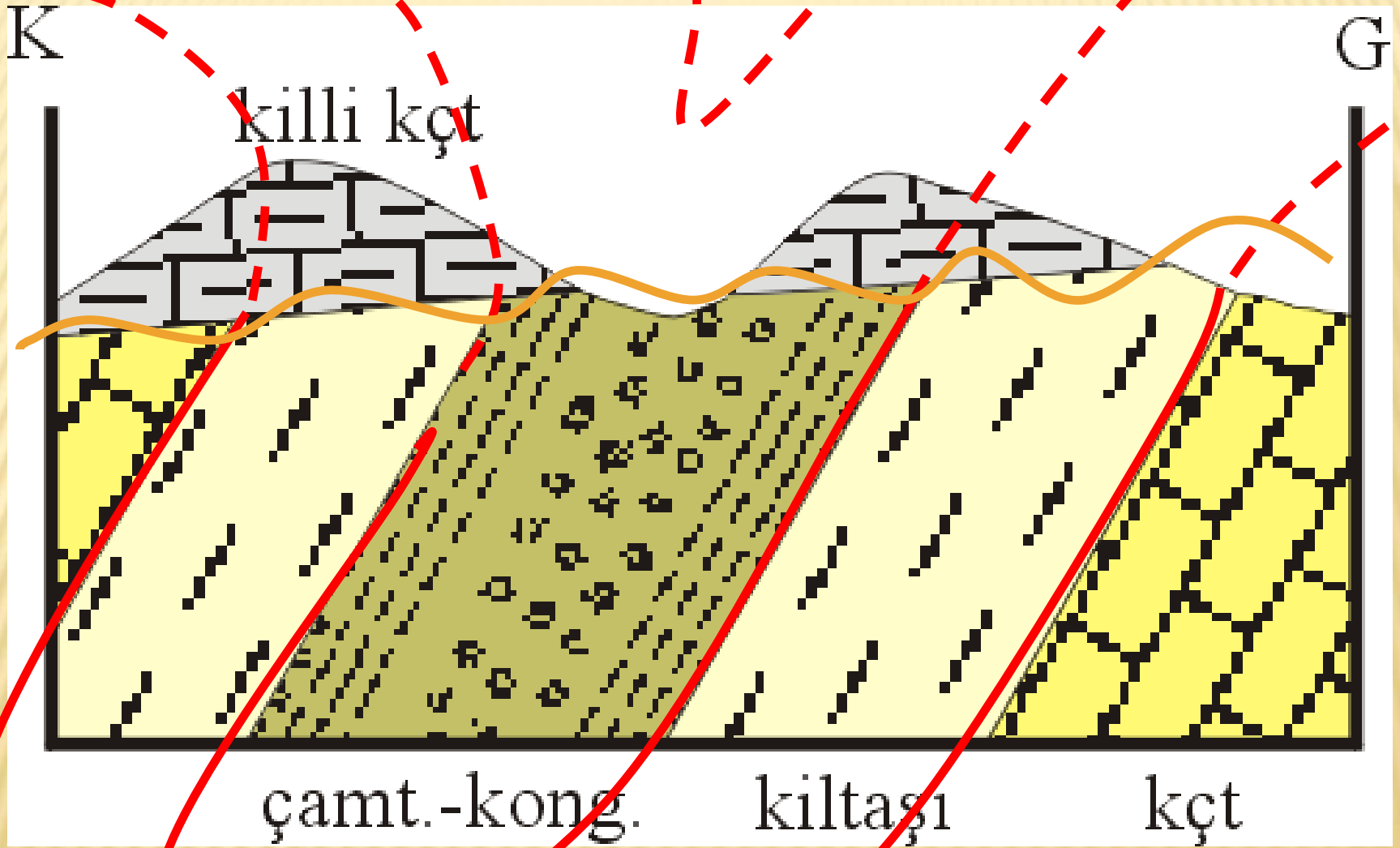
Paleoenvironmental approaches:

Loftusia sp., *Orbitoides* sp., *Triloculina* sp., Algae within the limestone unit are known as shallow marine organisms. Among them, *Triloculina* & algae show lagoon environment. Due to lack of the data on their abundances, it is said that the unit was deposited within shallow water environment.

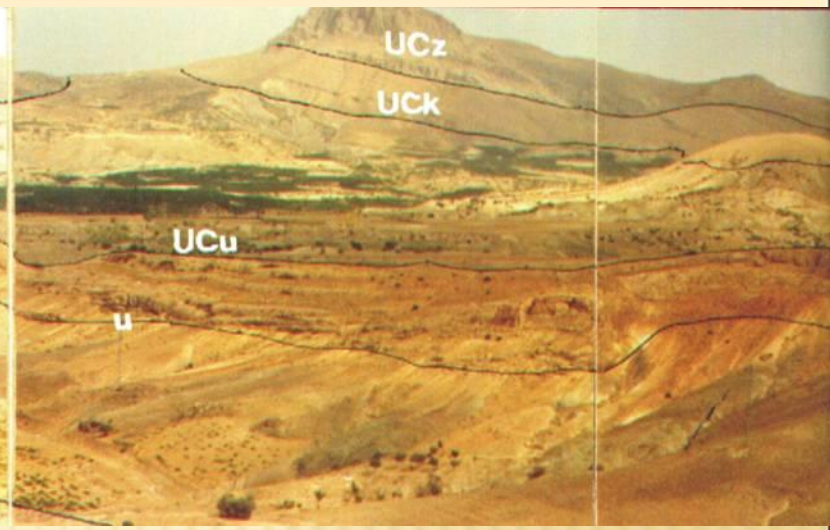
Globotruncana sp., *Heterohelix* sp., within the claystone unit are open-sea organisms. Lithology & fauna indicates open-sea conditions.

Richness of *Globigerina* sp. from the claystone-conglomerate unit also shows open-sea environment. Towards to upper part, *Nummulites* sp., *Assilina* sp., *Peneroplis* sp. indicates a shallowing water paleoenvironment.

Miogypsina sp., *Lepidocyclina* sp., are shallow water benthic foraminifera.



Hekimhan



F. Fay

JCoc. Jura-Kretase ofiyolitik kayalar

u- uyumsuzluk

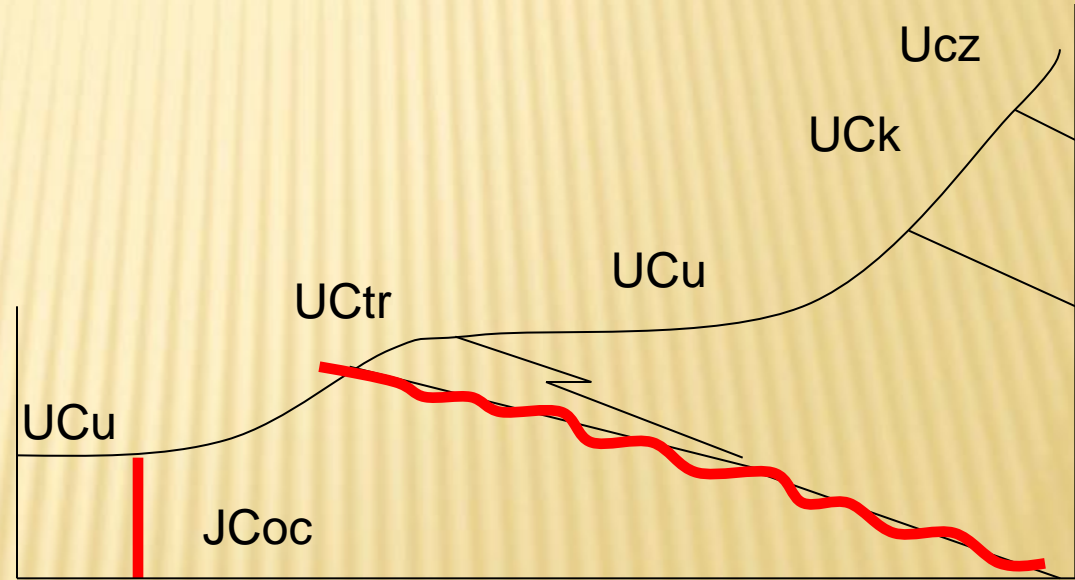
UCtr. Tohma resifleri (bol rudistli)

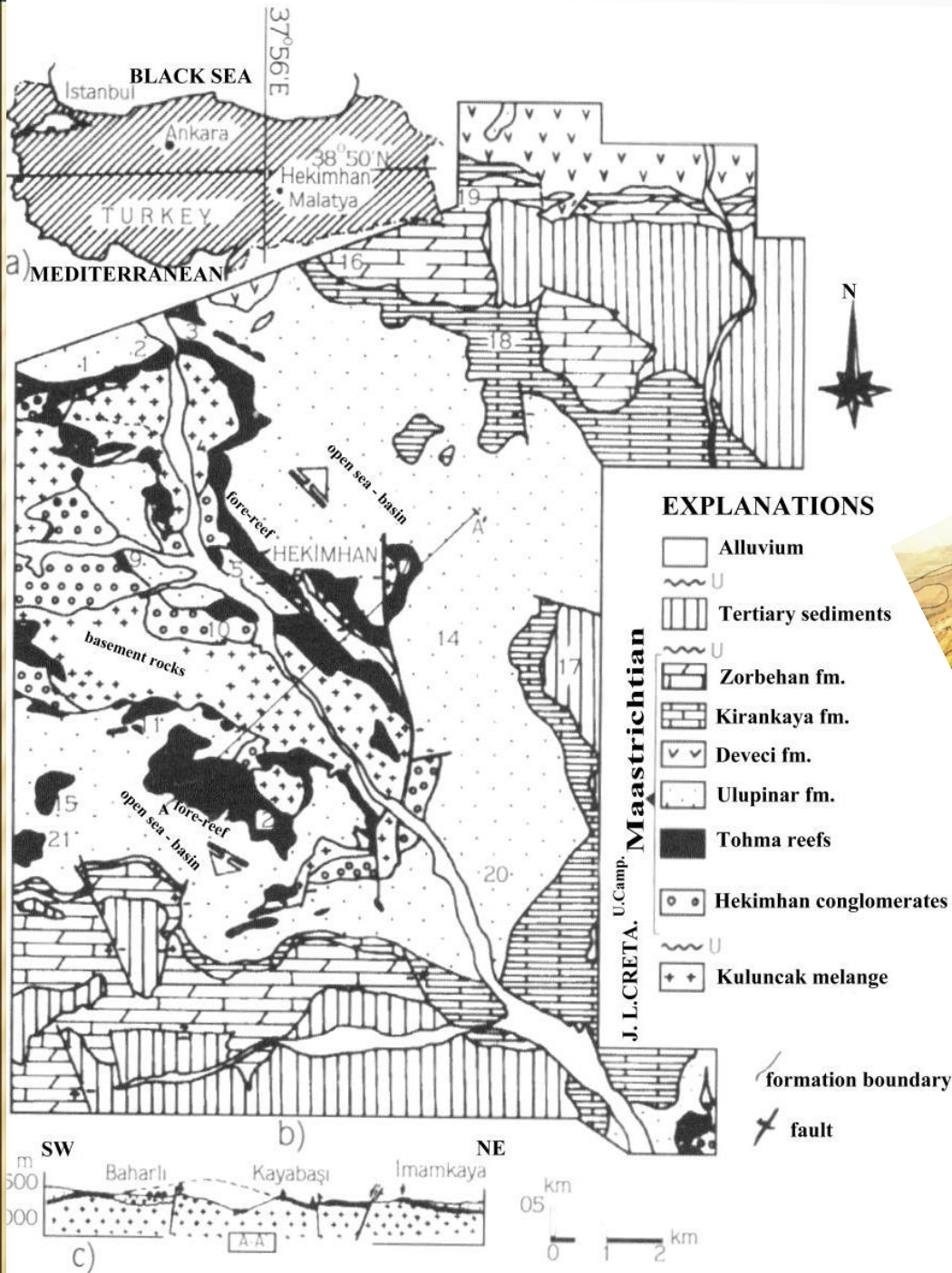
Ucu. Ulupınar fm.-kilitaşı-kumtaşı
ardalanması (altta *Orbitoides*,
Siderolites, *Inoceramus*, üste doğru
Globotruncana)

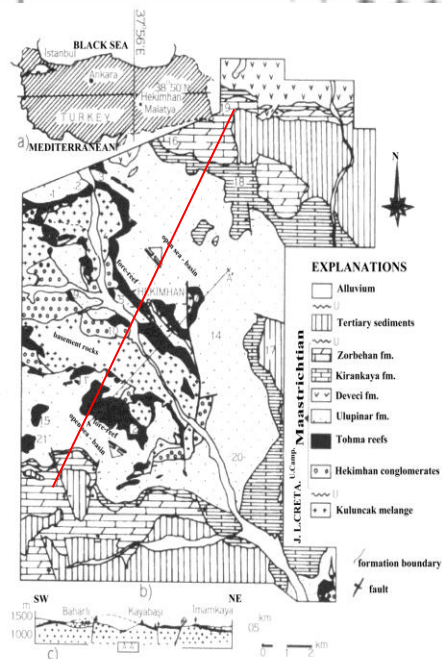
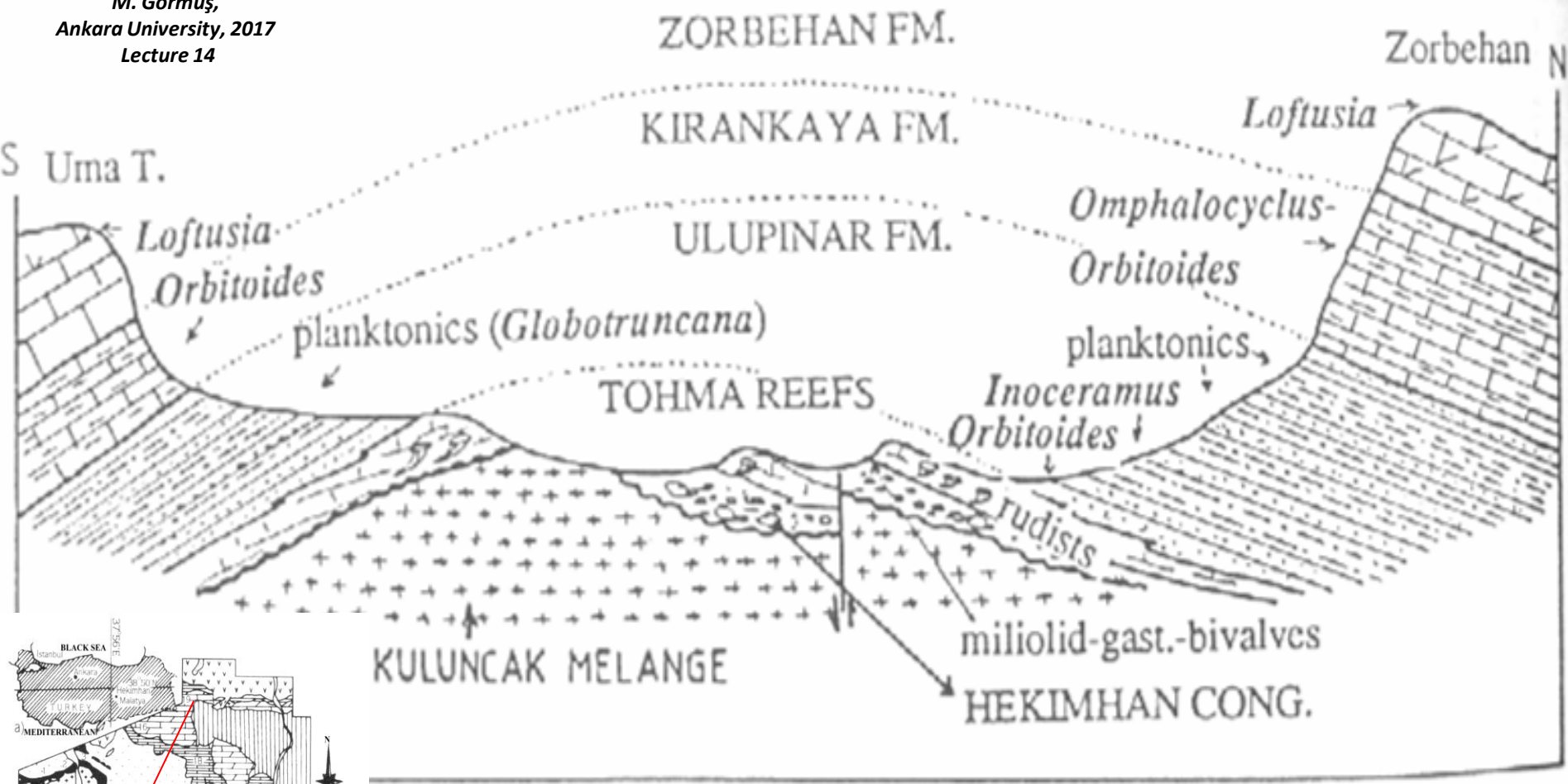
UCd. Deveci Volkanikleri

UCK. Kırankaya Fm. Killi kireçtaşları
(*Orbitoides*, *Lepidorbitoides*)

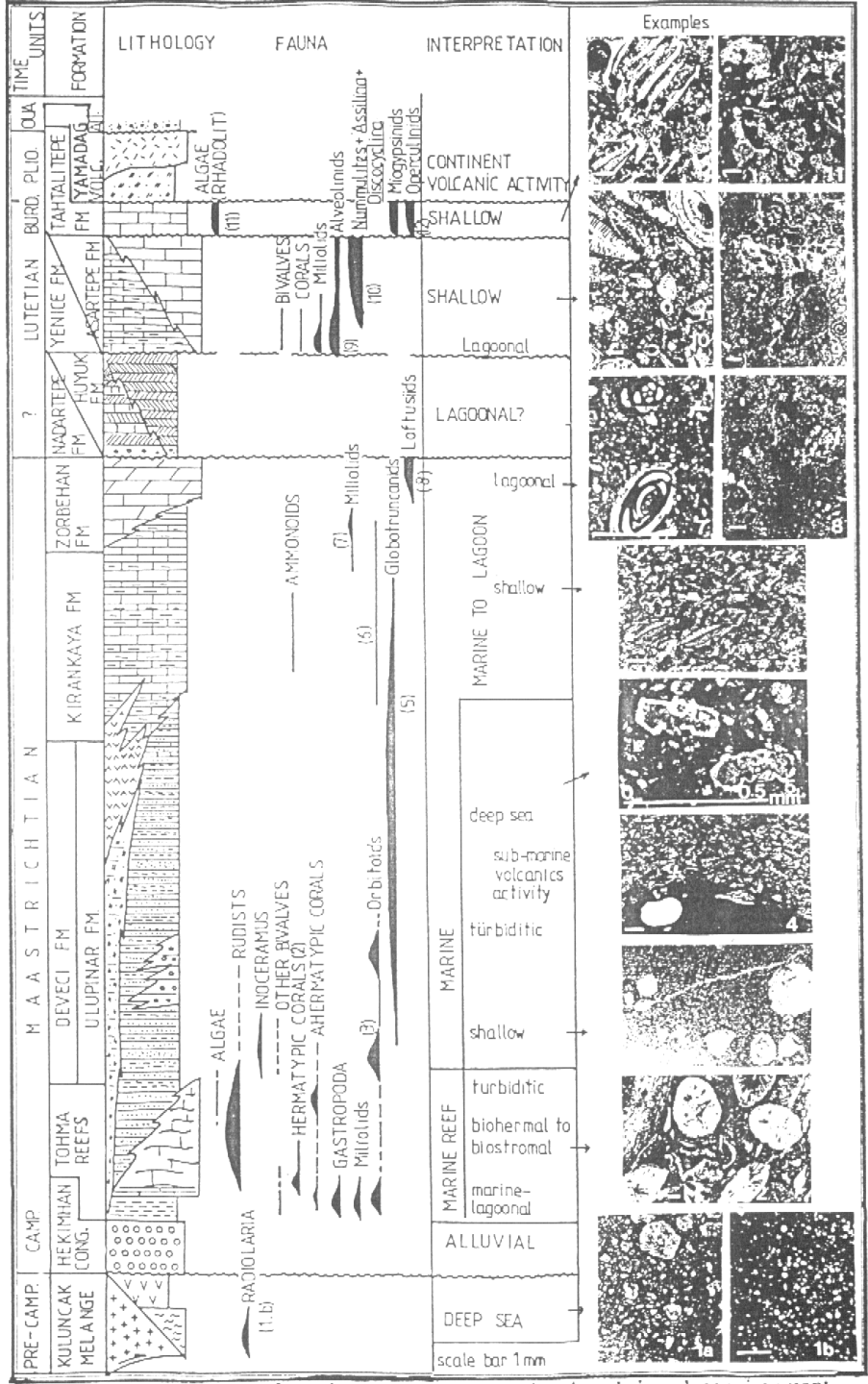
Ucz. Zorbehan Fm. Dolomitik kçt (*Loftusia*)







A schematic geological cross-section, S-N in direction showing a large anticline and transgressive to regressive succession in the area during the Campanian to Maastrichtian times.

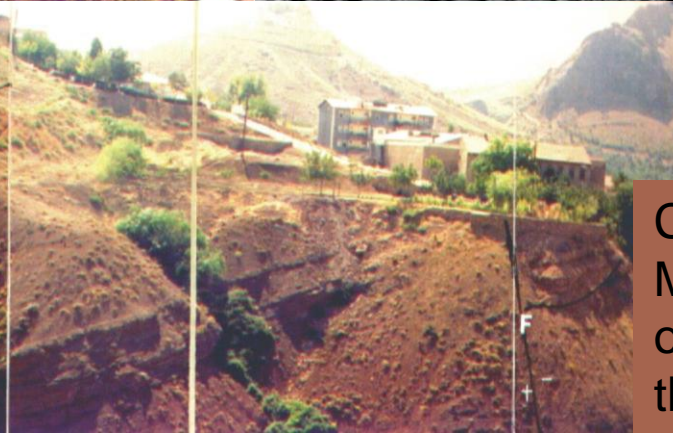
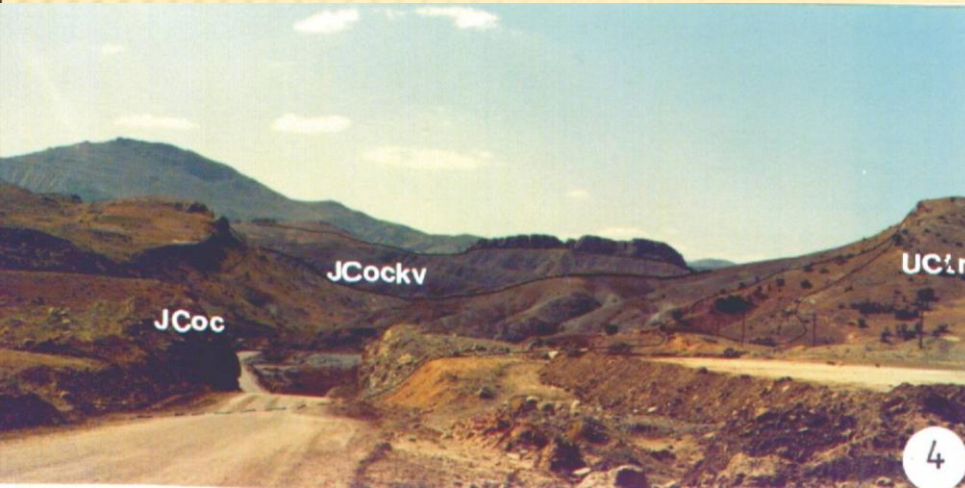
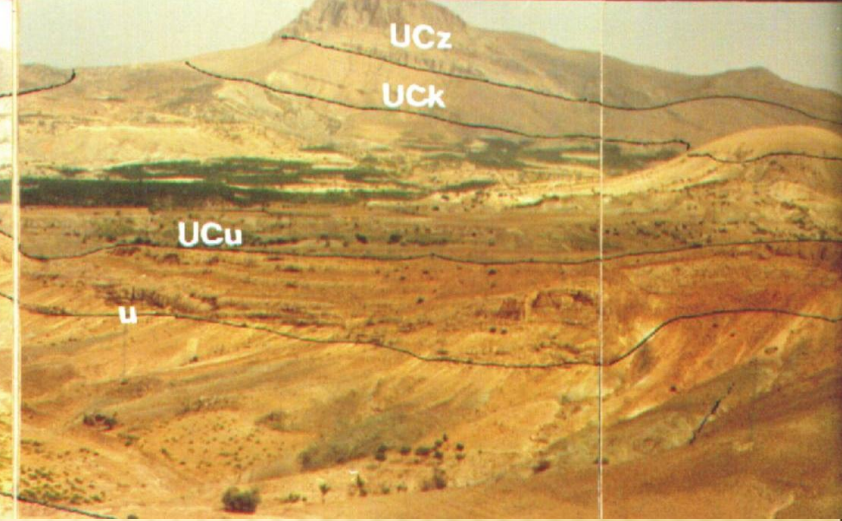




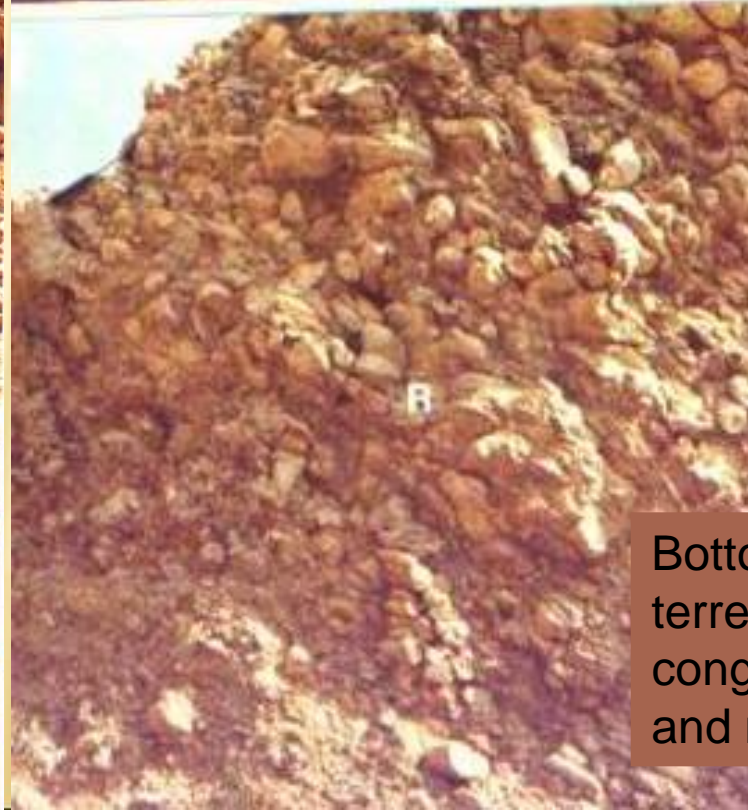
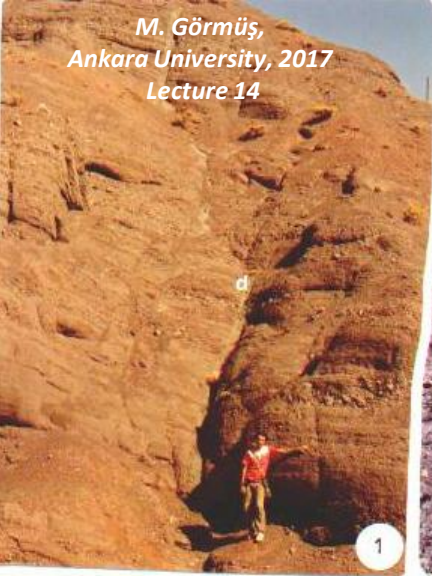
Basement units (Kuluncak melange rocks including deep sea sediments).

At the bottom: ophiolites

At the top: radiolarite-cherts and fine clastics



Campanian to
Maastrichtian sequence
overlying unconformably
the melange



Bottom
terrestrial
conglomerates
and reef views



Lateral facies changes with volcanoclastics of the Deveci Fm., F. Faults



Top units

Maastrichtian in age

Bottom units

Pre-Maastrichtian in age



Eocene sequences overlying the
Maastrichtian sediments



A grabene system, light unit is Eocene,
the others are Maastrichtian sediments



Miocene carbonates showing a large scaled cross bedding



Carbonates of Miocene transgression on the Cretaceous (left side) and Eocene (right side) sediments

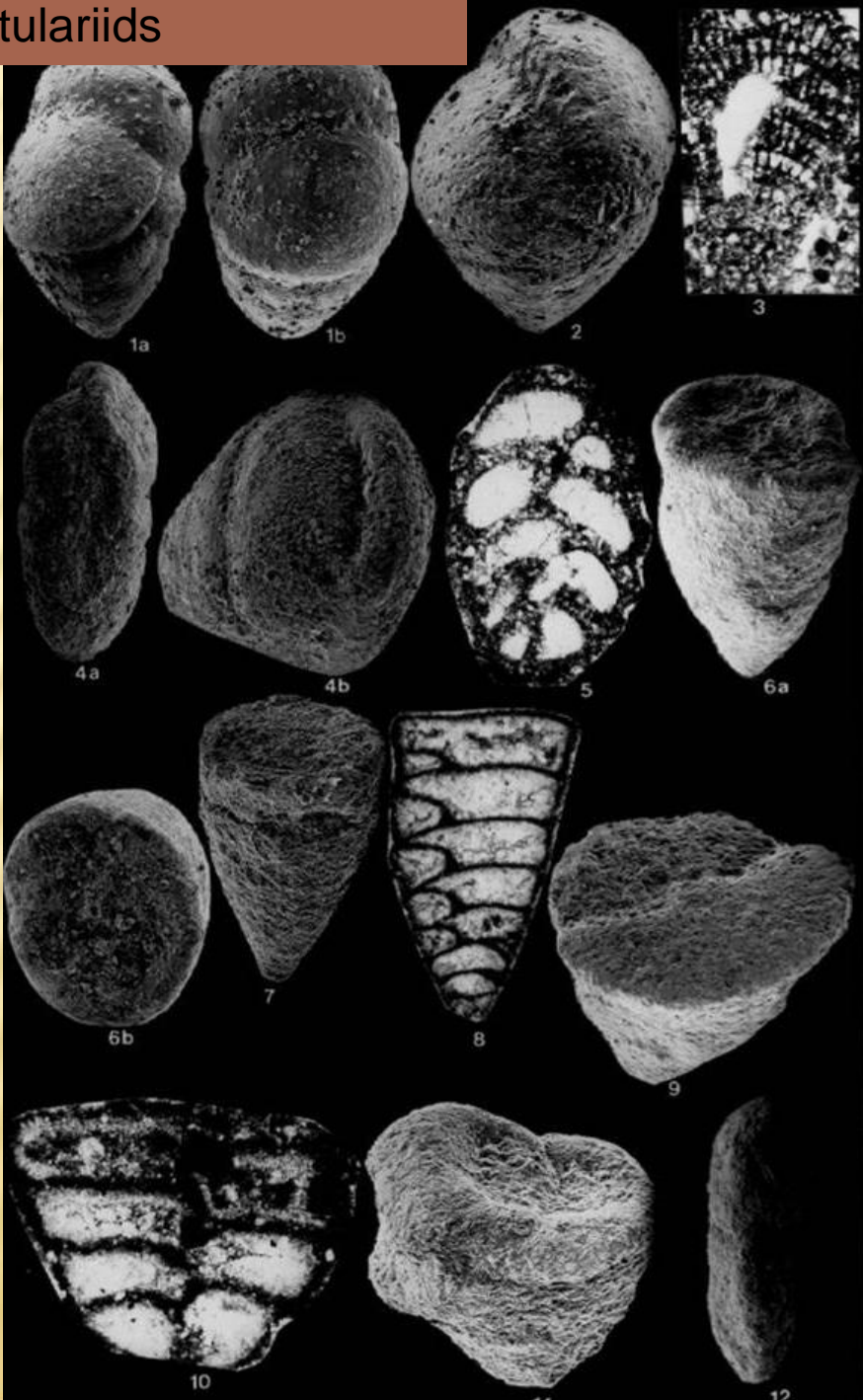
Miocene unit: *Migypsina*, *Lepidocyclina*'



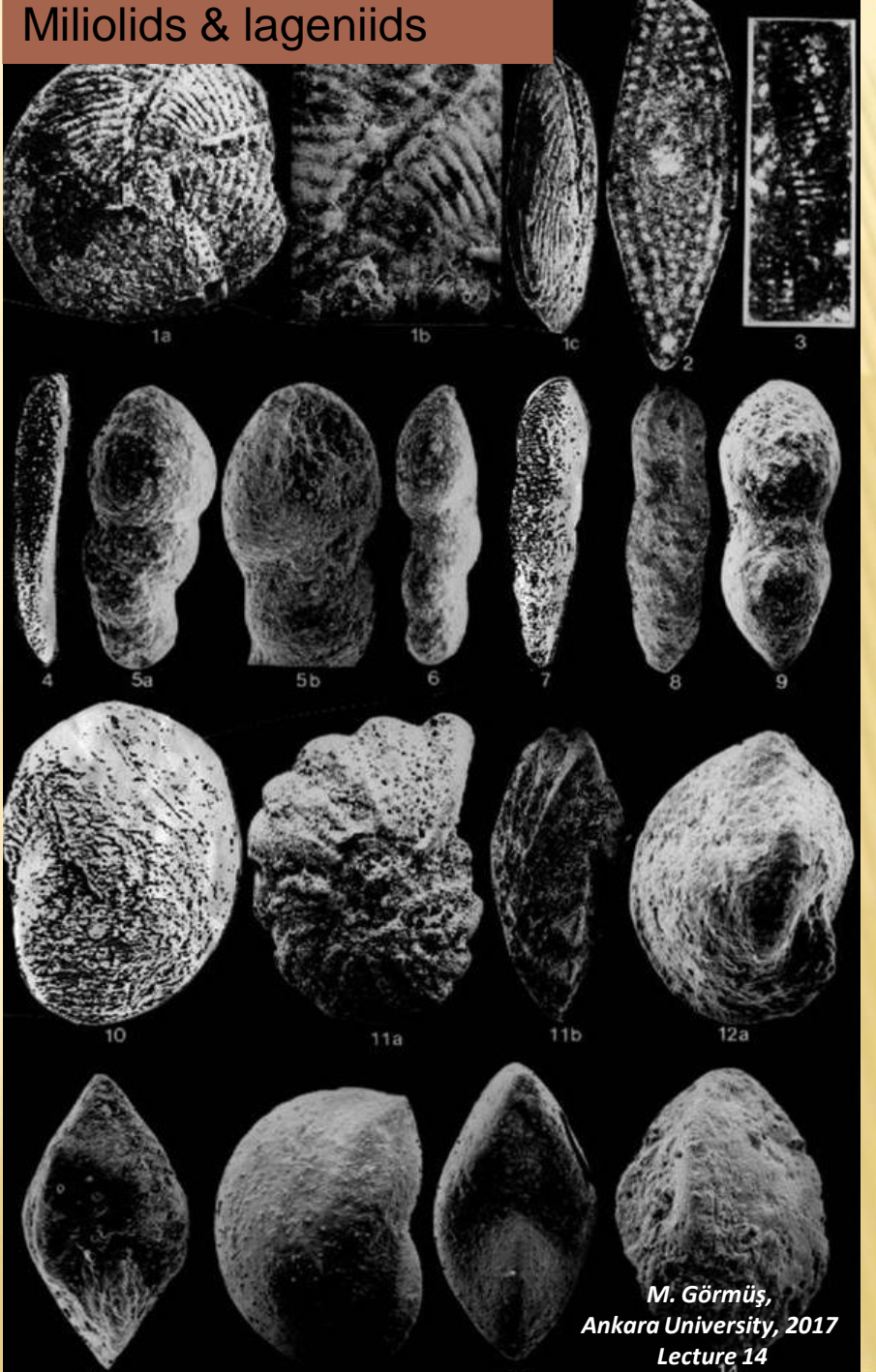
Late Cretaceous lmst: *Orbitoides*

Eocene clayey limestone: rich
Nummulites

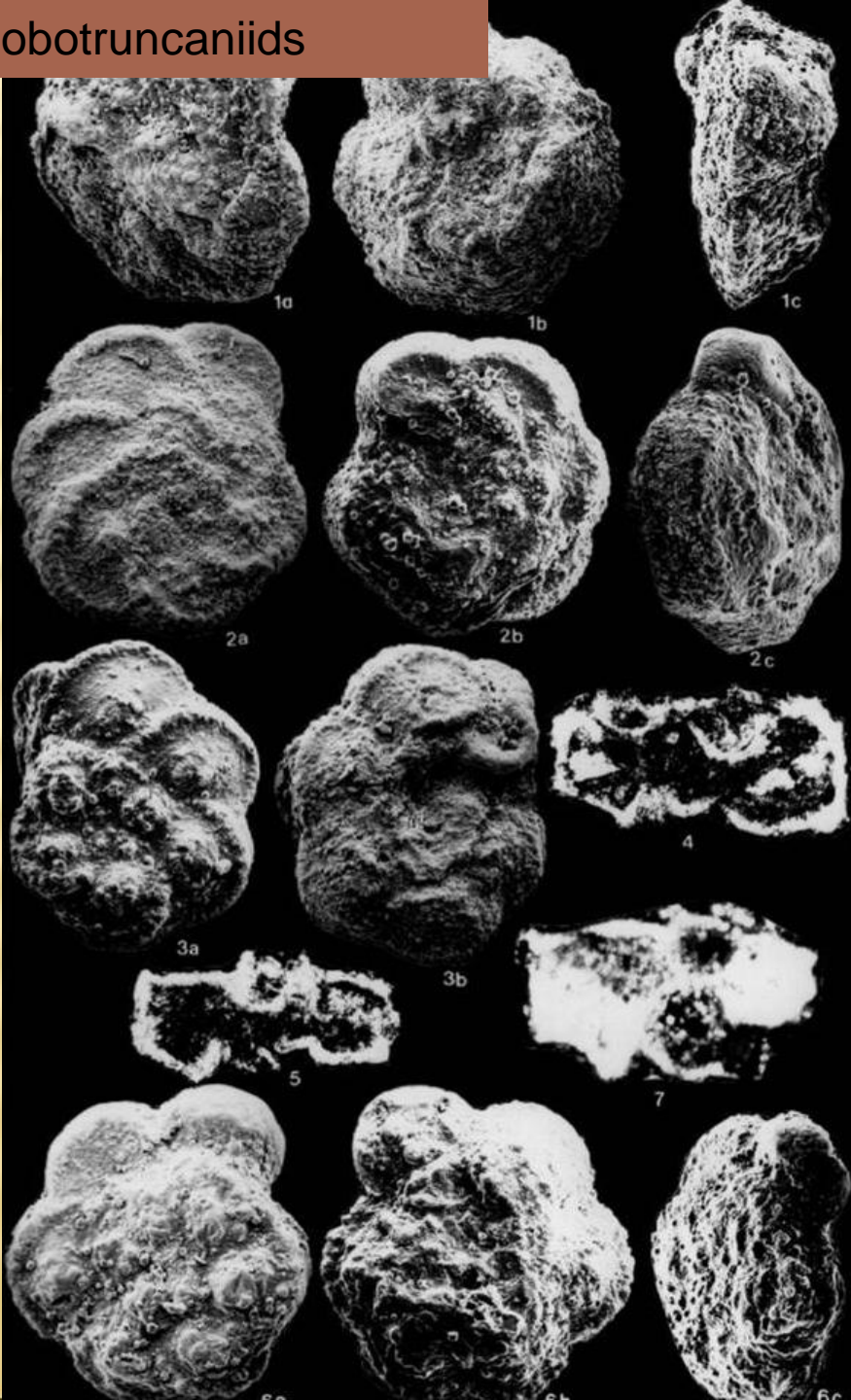
Textulariids



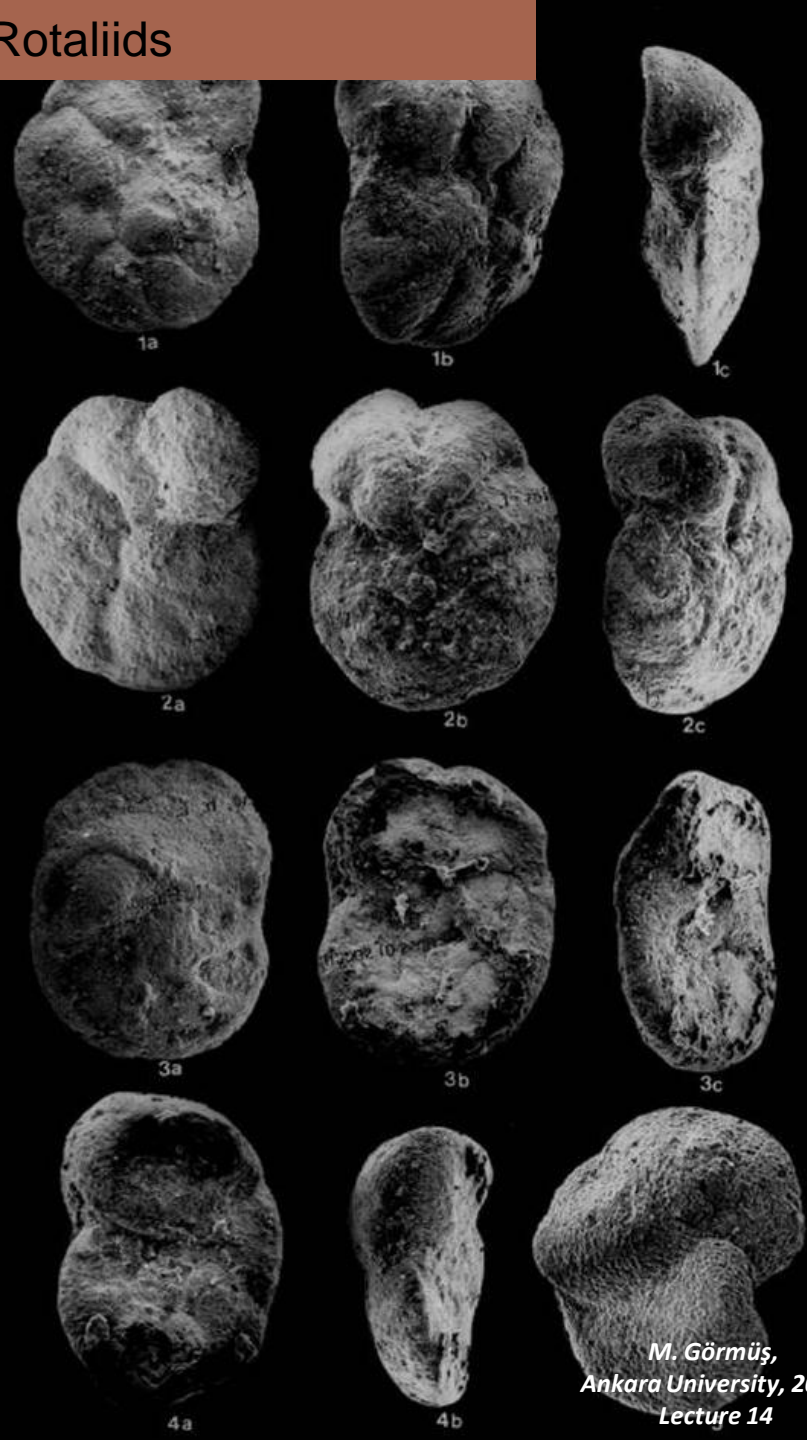
Miliolids & lageniids

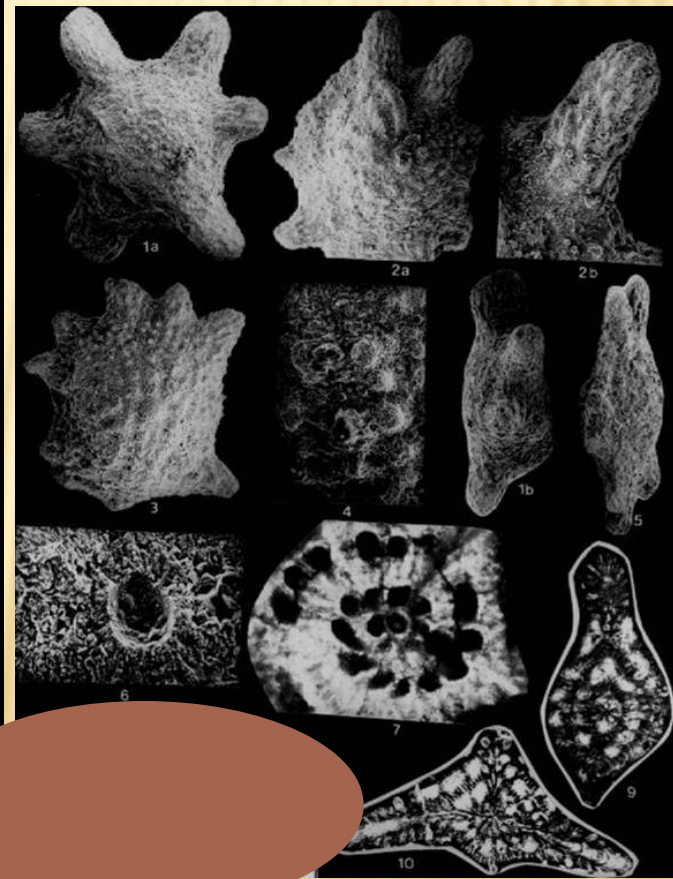
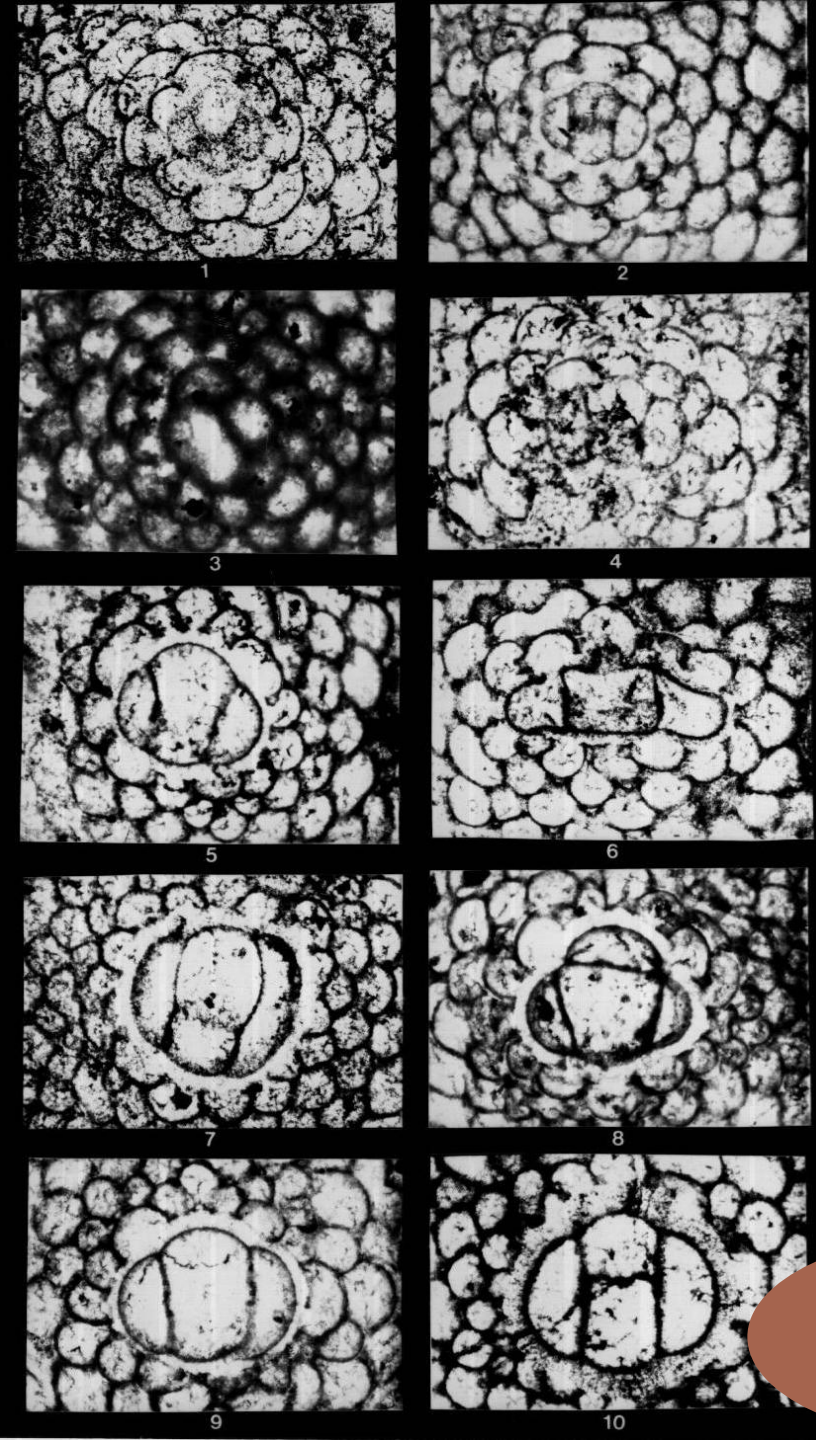


Globotrunciids

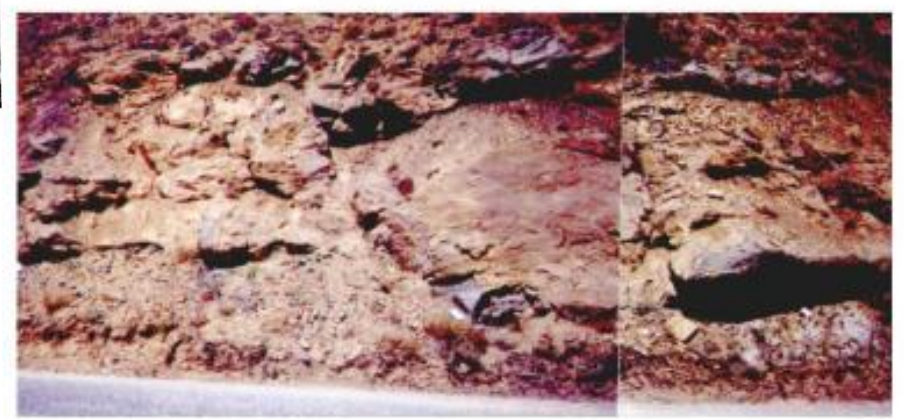
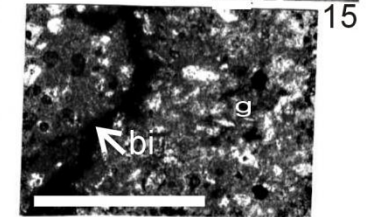
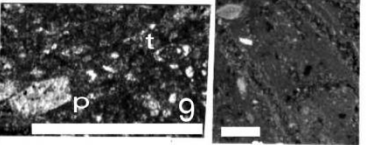
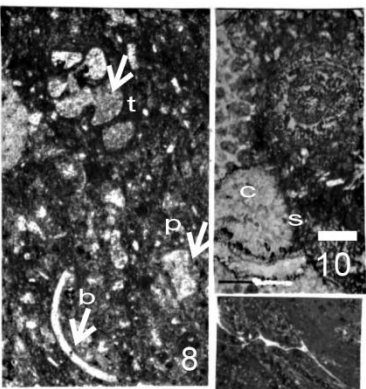
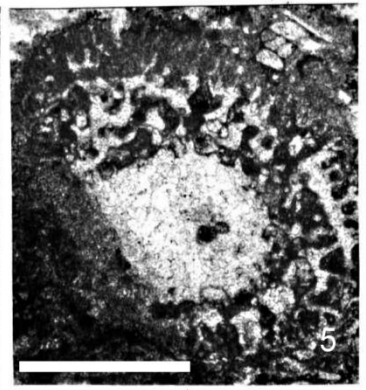
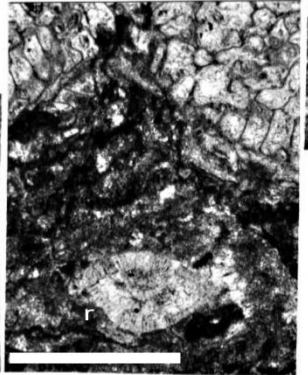
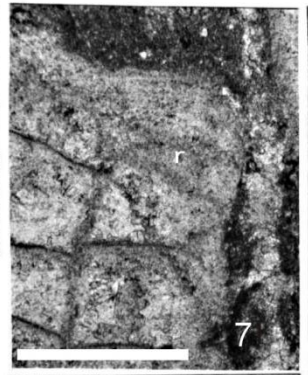
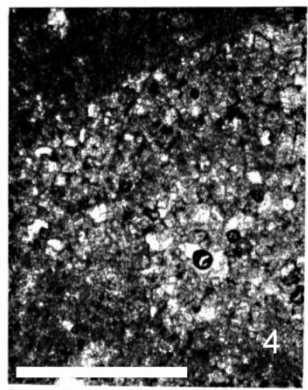
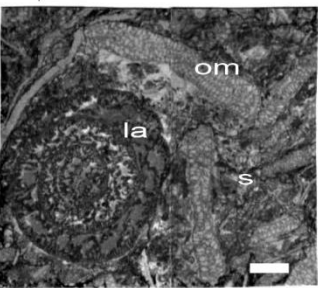
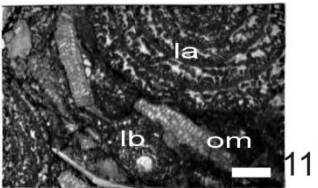
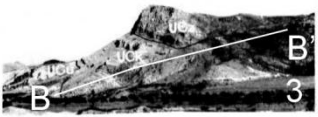
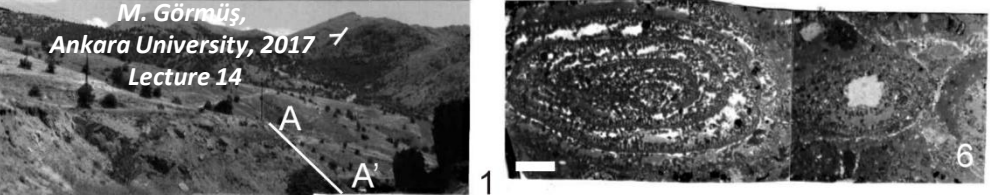


Rotaliids



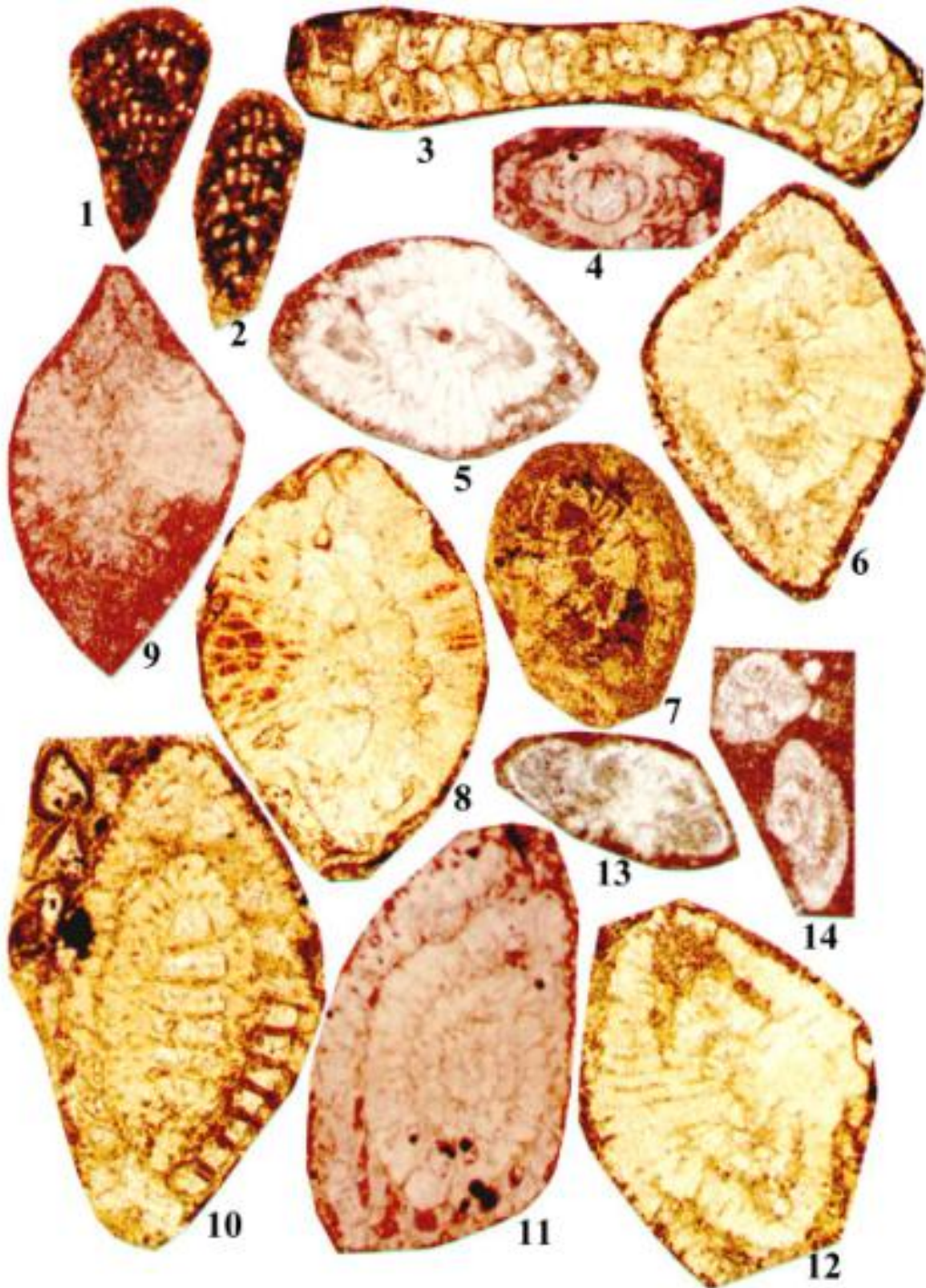


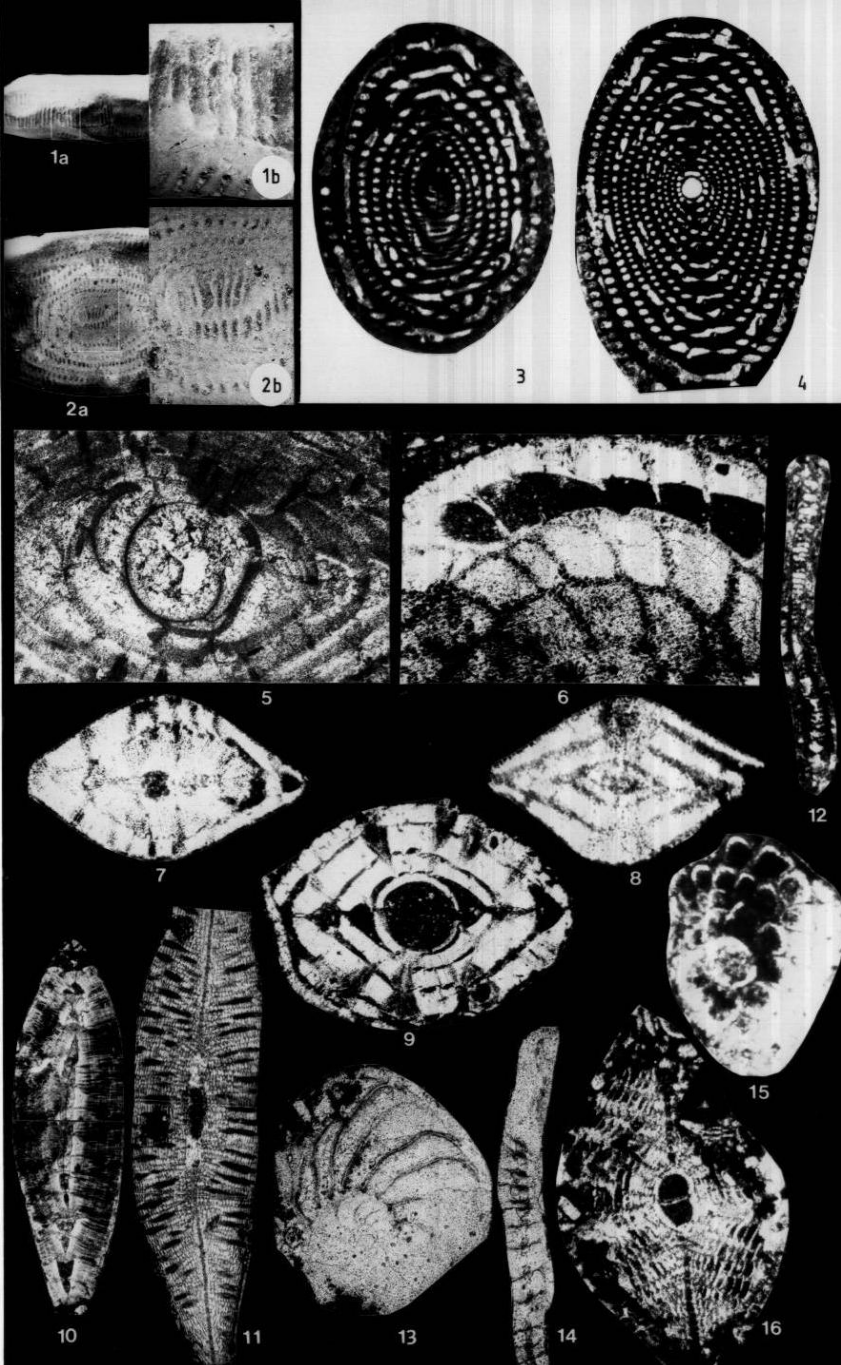
Orbitoides
 Embryo views
 on the left,
 Siderolites on
 the right
 Location of the
 fauna
 asociation at
 the top,



Maastrichtian loftusiid ant their locations

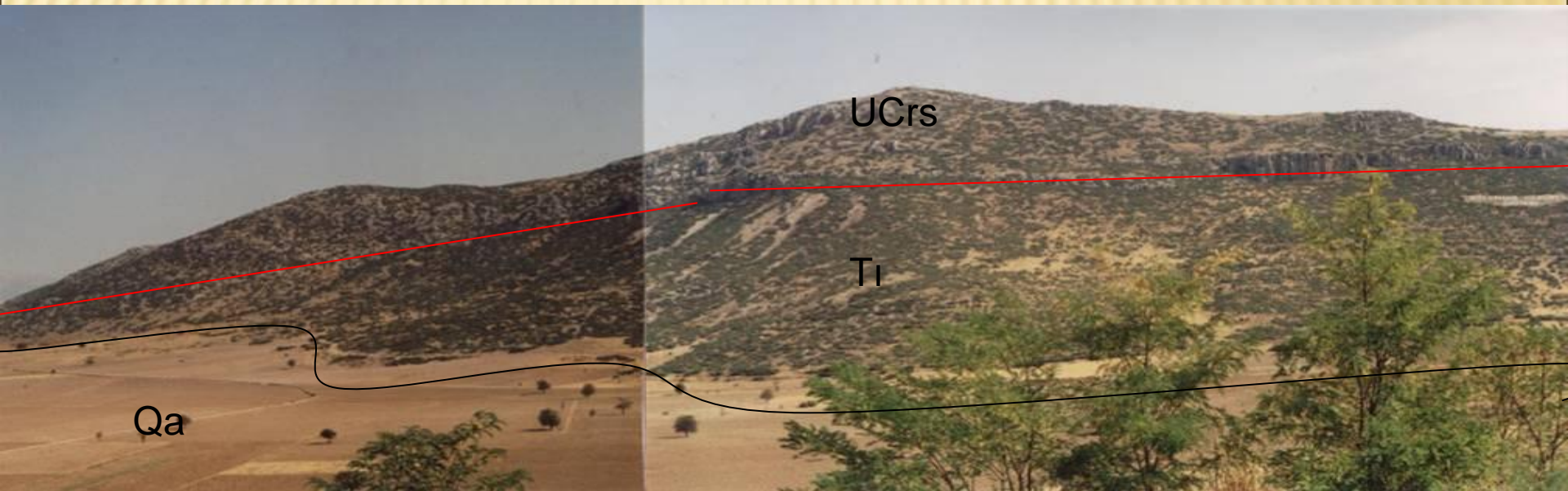
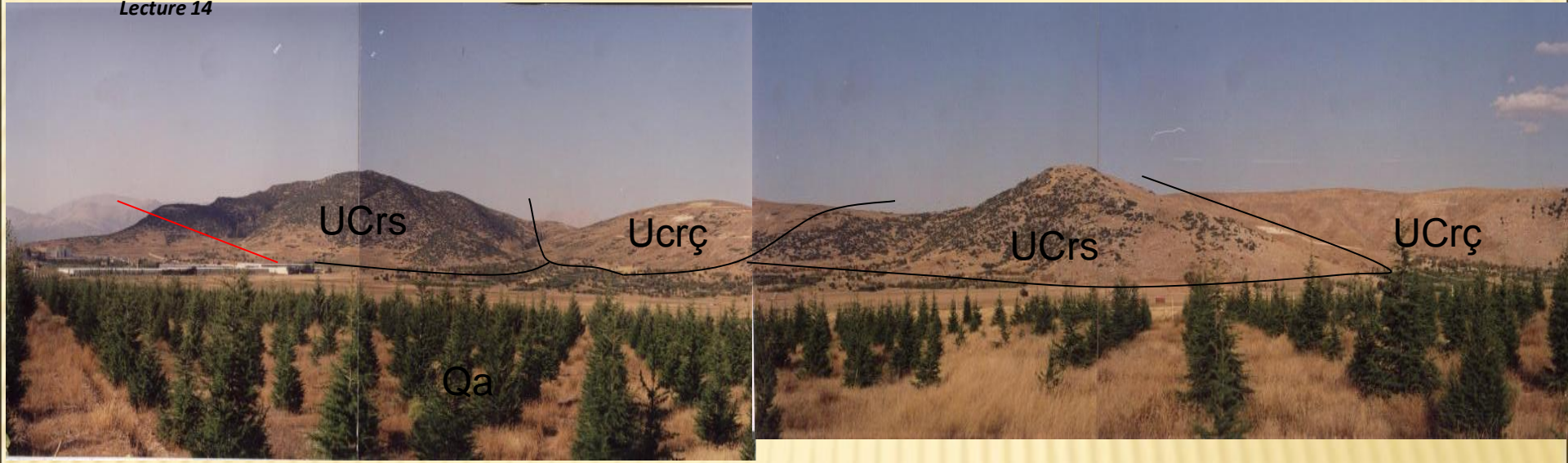
Upper Maastrichtian fauna views





Eocene and Miocene benthic fauna

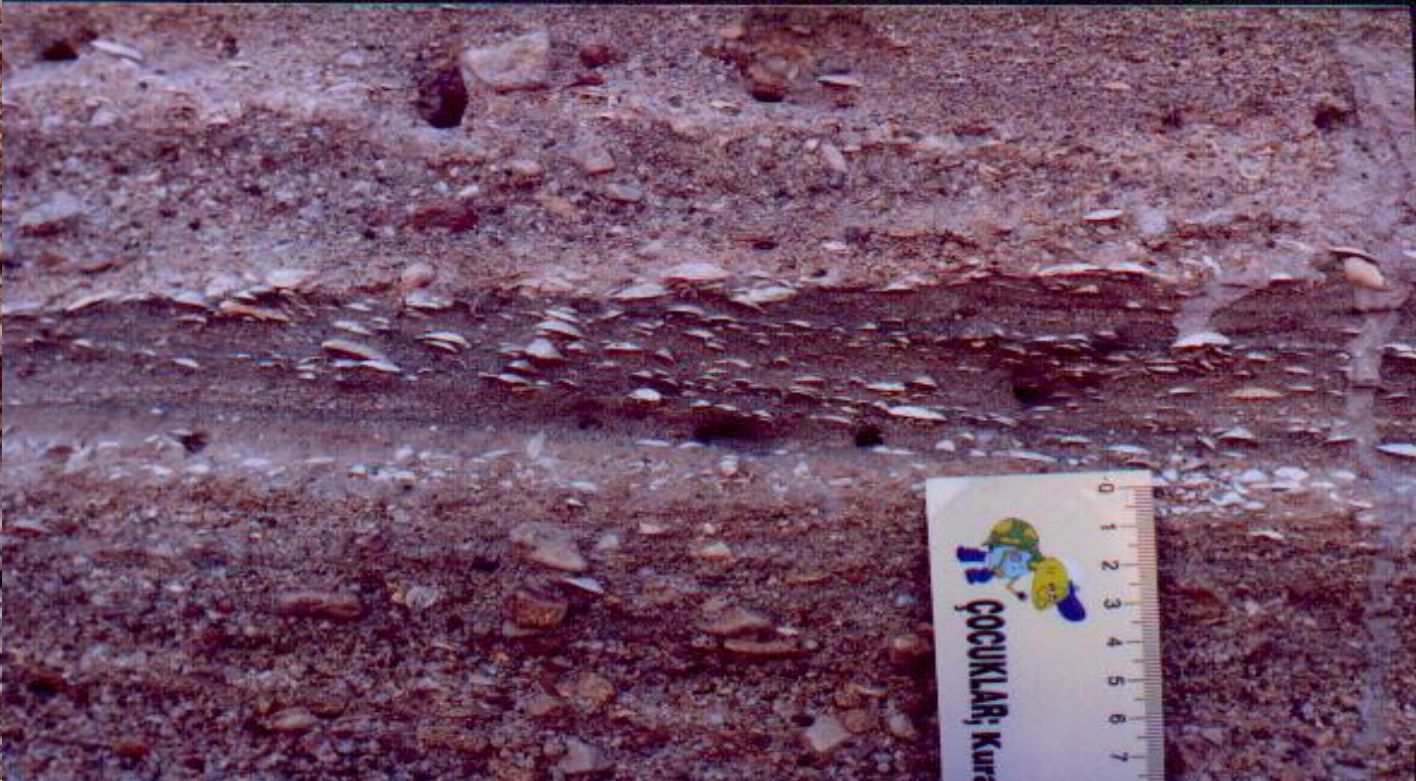
SDU Campus & its surroundings

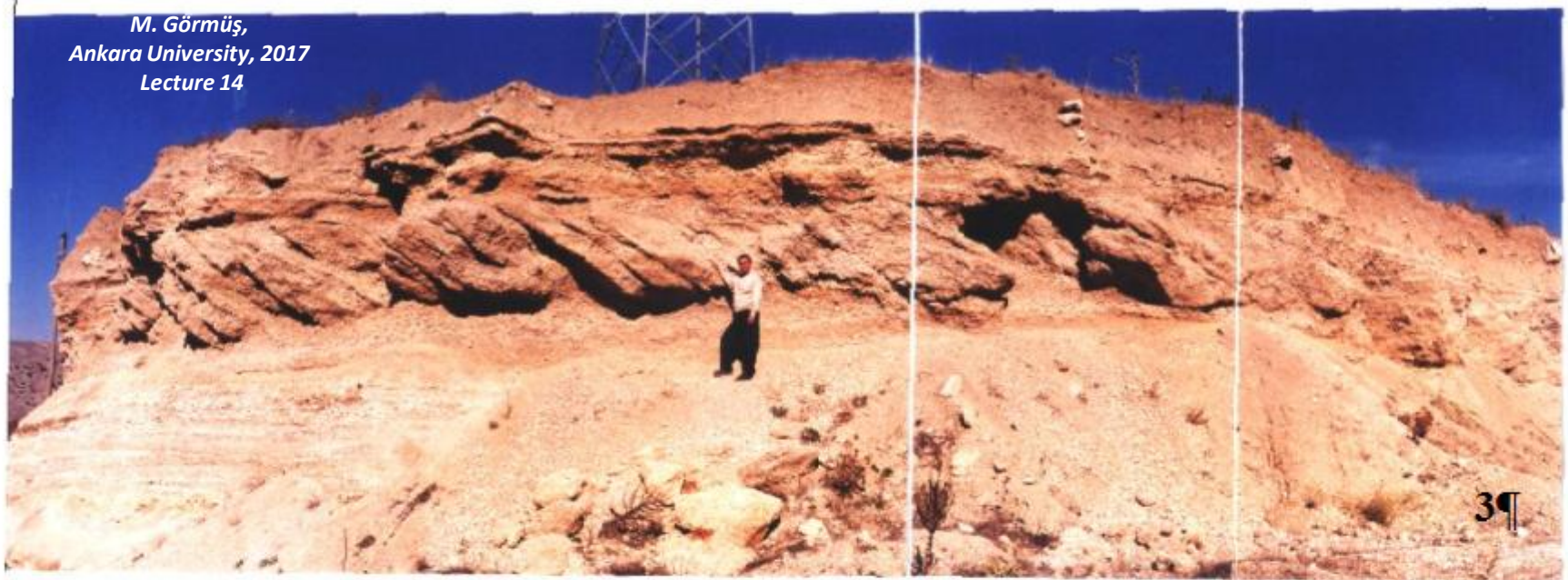


Views from Cretaceous aged carbonates (UKrs. Söbüdağ Imst. UKrc. Çiğdemtepe Imst.) and Lower Tertiary aged clastics (Isparta Fm.), red lines show normal faults.

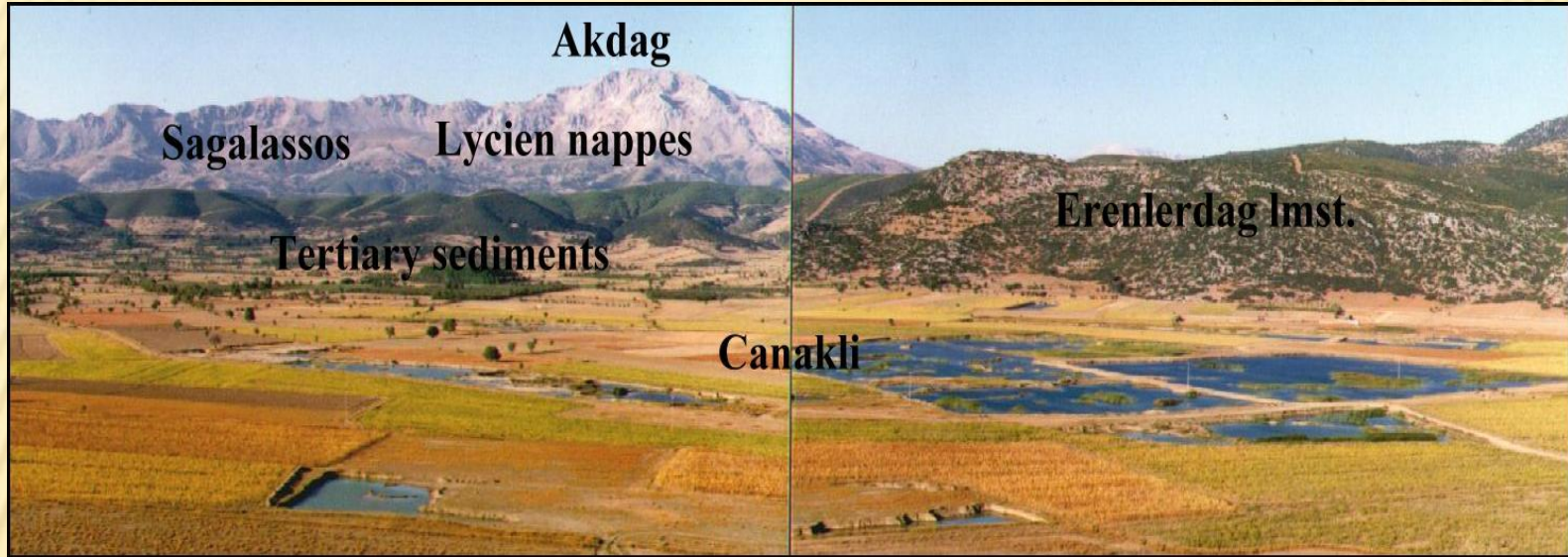


Plio-Quaternary
aged lacustrinal
sediments





Sagalassos-Dereboğazi

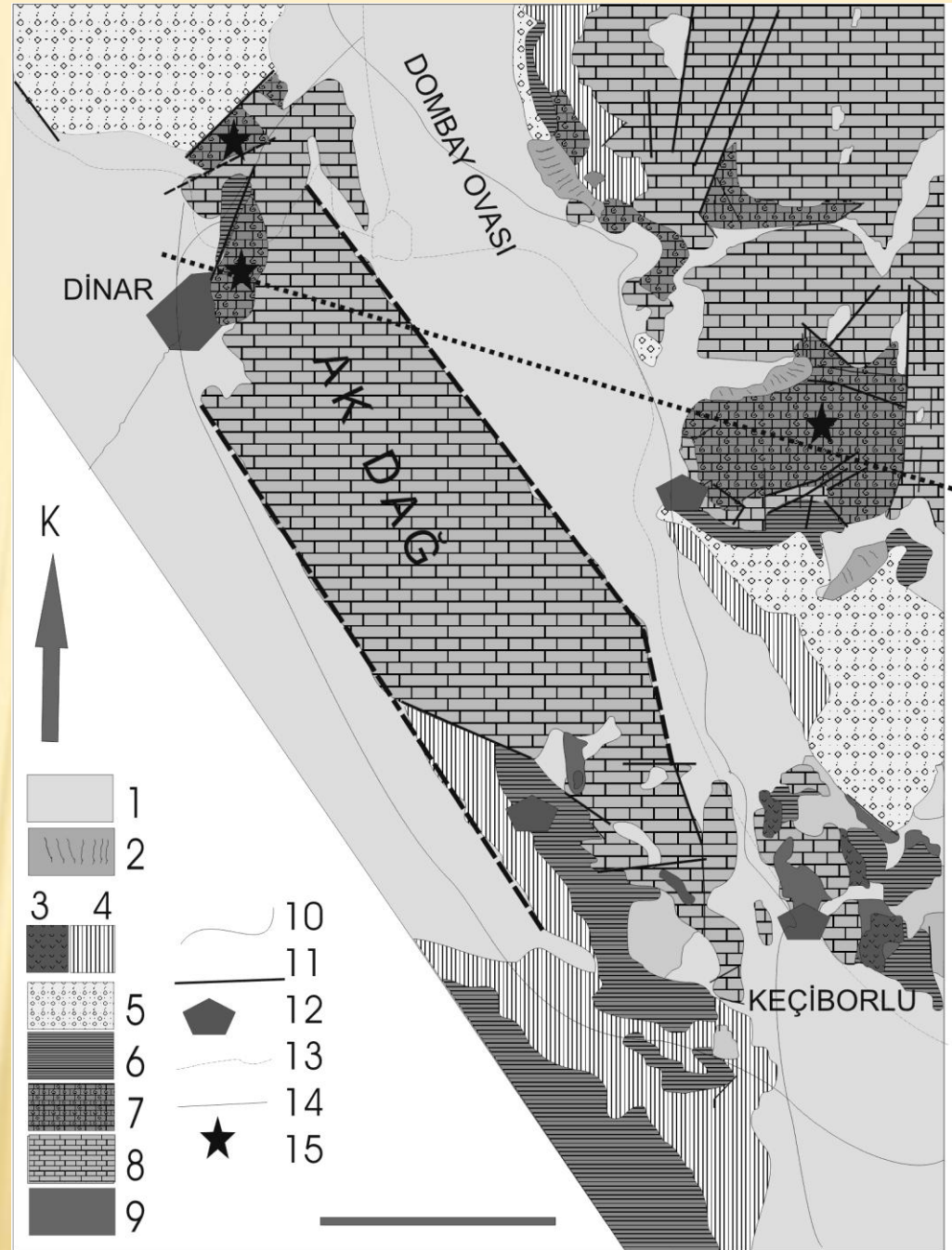


Clay material area around Canaklı for Sagalassos settlement place showing autochthonous Cretaceous aged Erenlerdag limestone and Tertiary sediments (C/T boundary) and allochthonous carbonates in Akdağ, namely Lycien nappes, looking towards the north.



Unconformity between Ispartaçay (TrJ1) and Karabayır (Mk) formations, Mk1. conglomerates, Mk2-3. algal, miliolid bearing carbonates (Görmüş & Hançer, 1997), İmrezi Village around.

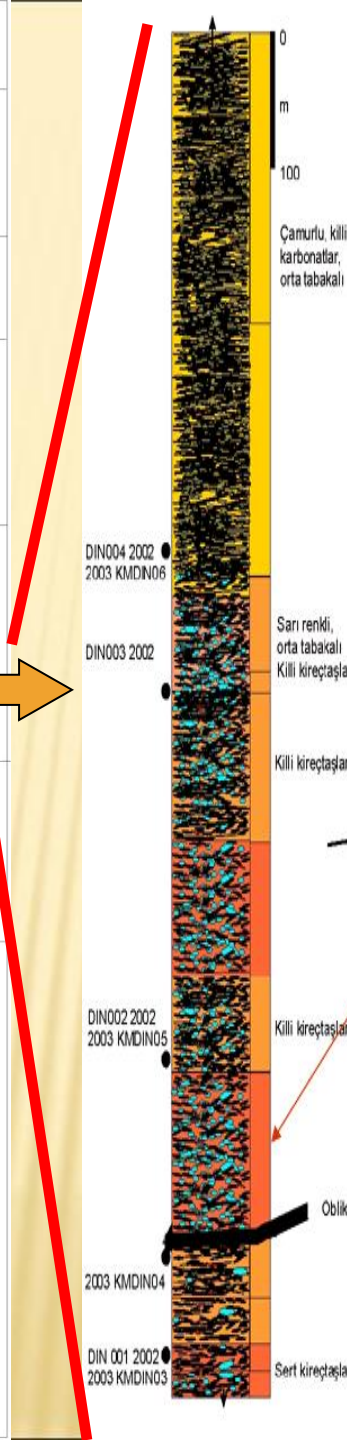
Dinar



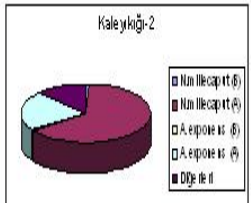
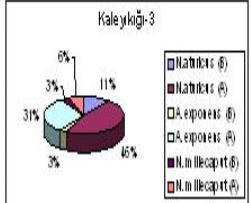
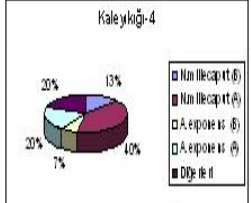
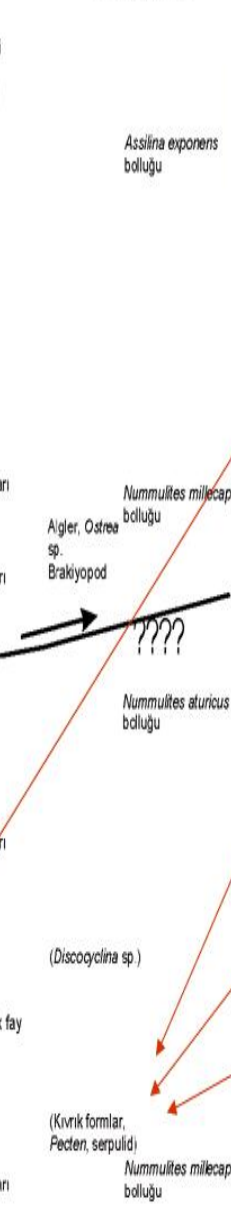
Arazi görünümüleri

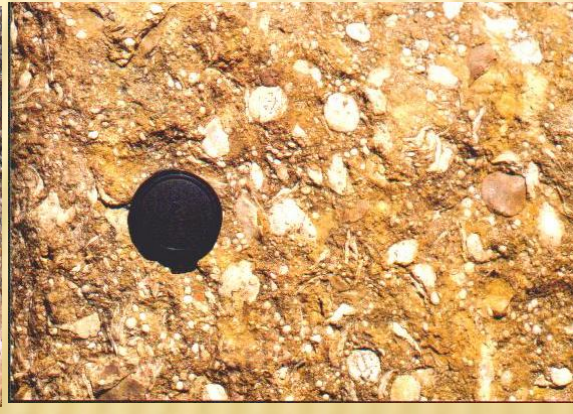
SENOZOYİK

MESOZOYİK

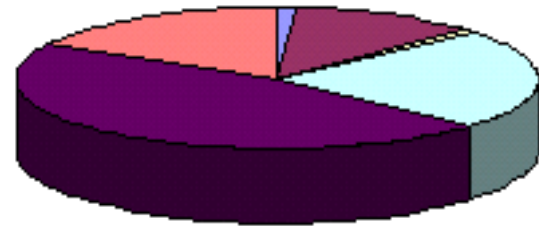


- Nummulites praetoricus (B formu)
- N. praetoricus (A formu)
- N. aturicus (B formu)
- N. aturicus (A formu)
- N. millecaput (B formu)
- N. millecaput (A formu)
- Diğer Nummulites türleri
- Asalina exponents (B formu)
- A. exponents (A formu)





Suçkan sert düzeyler

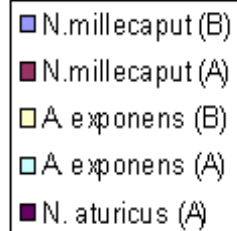
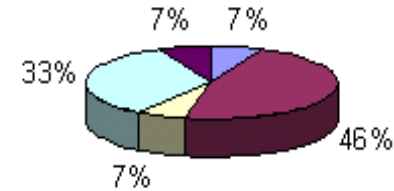


Alveolina'lı
düzeyler

N. aturicus
bolluğu

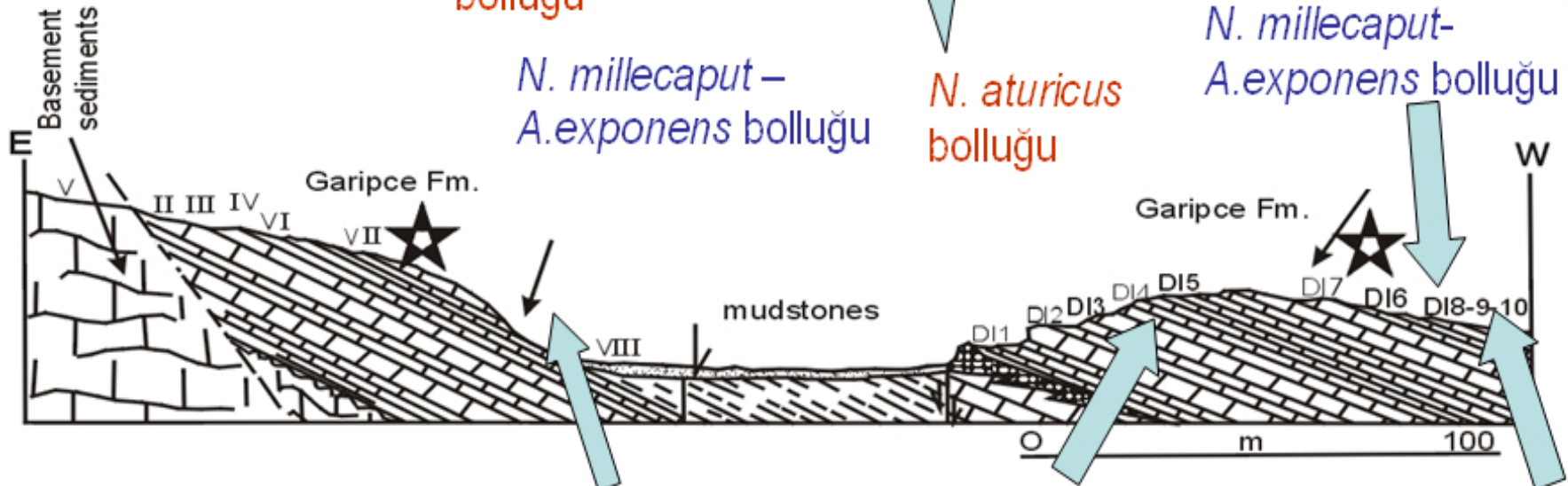
N. millecaput –
A. exponens bolluğu

Suçkan üst düzeyler



N. millecaput–
A. exponens bolluğu

N. aturicus
bolluğu



Bağlayıcı % 20

Fosil % 80

Bağlayıcı % 95

Fosil % 5

Bağlayıcı % 80

Fosil % 20

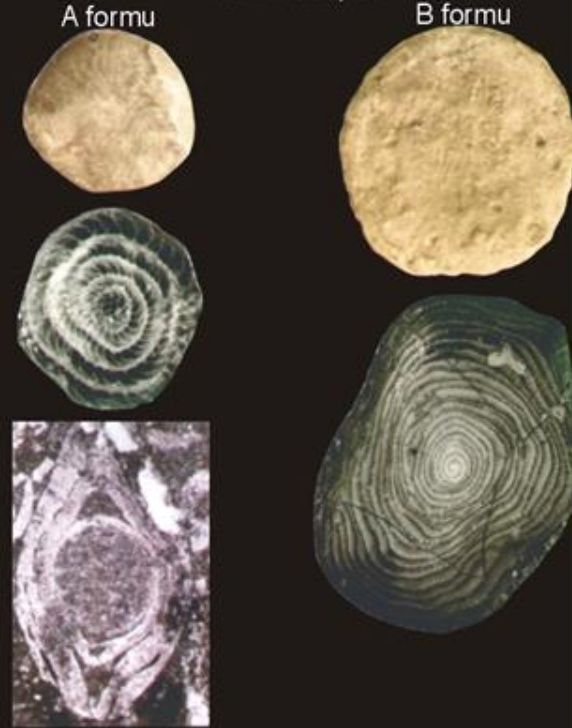
N. praeaturicus



N. aturicus



N. millecaput

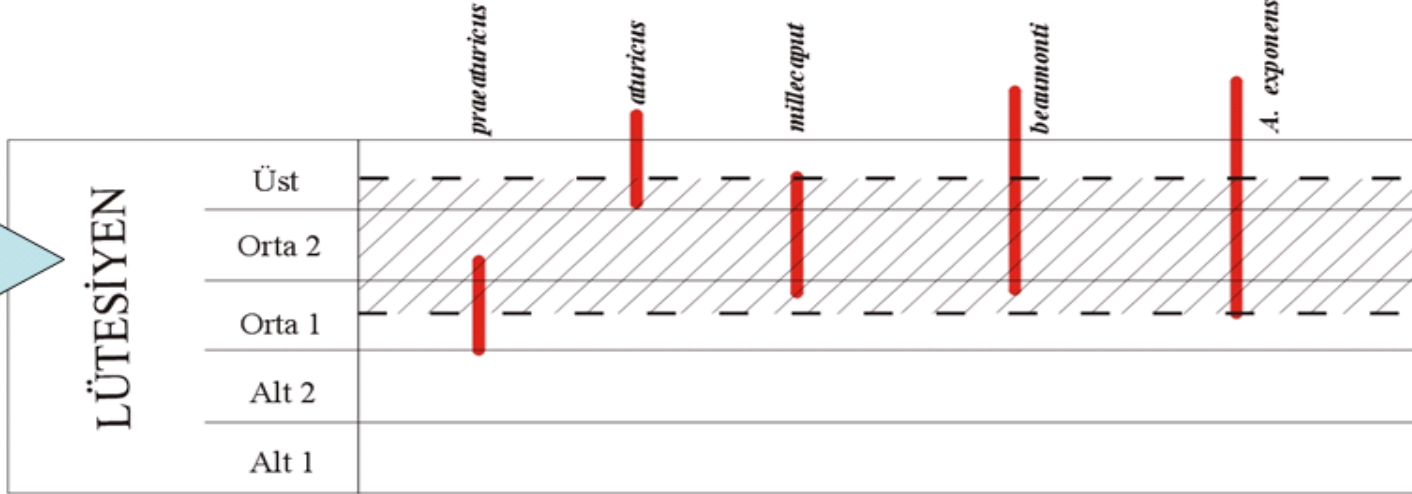
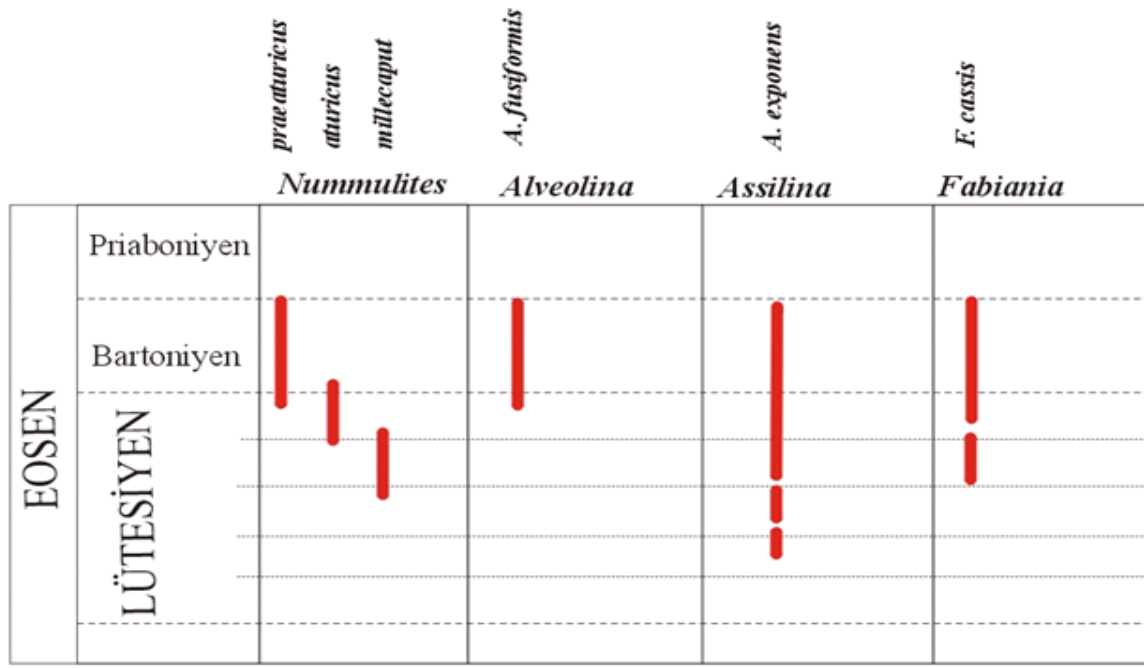


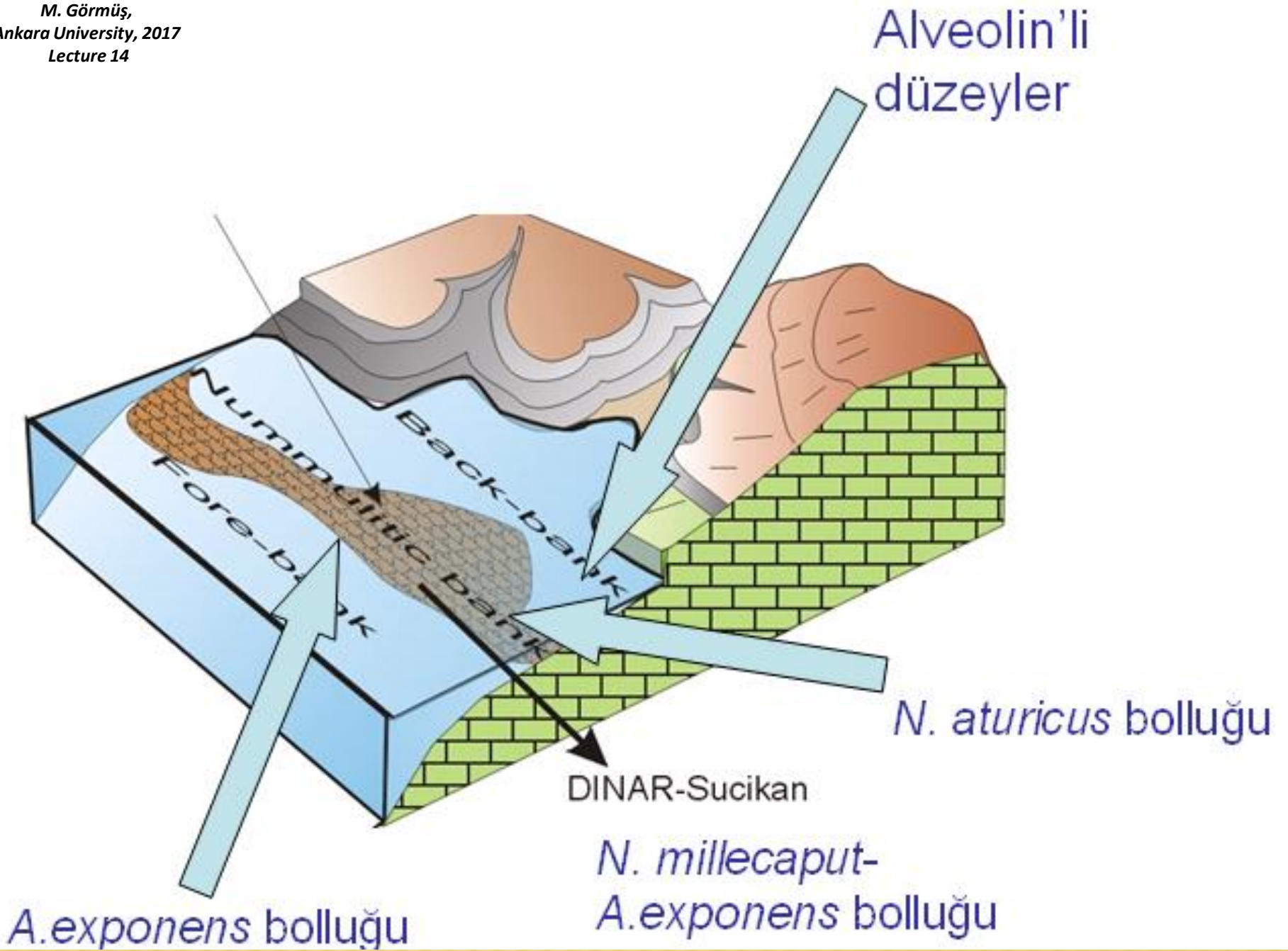
N. beaumonti
A formu

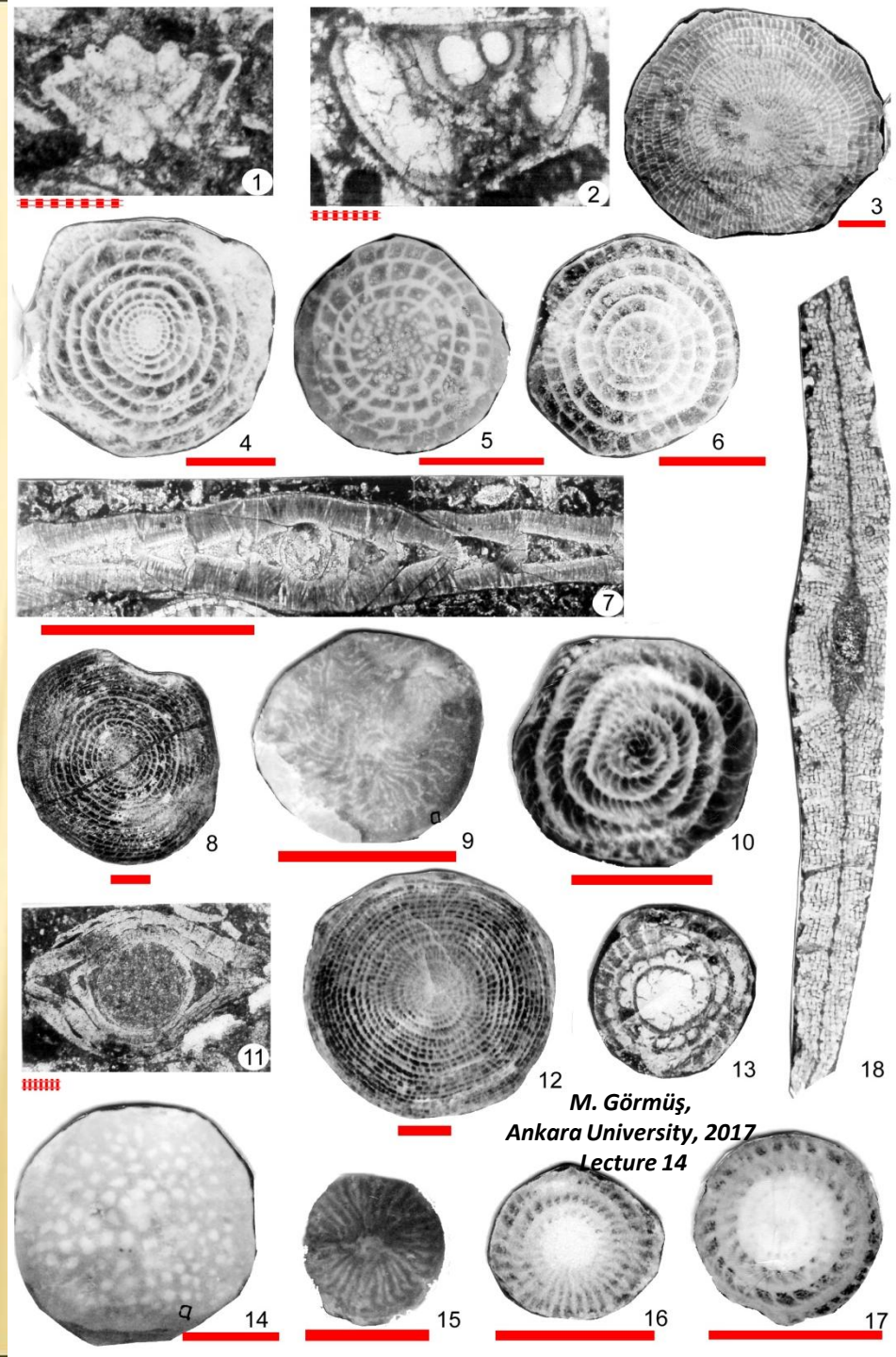
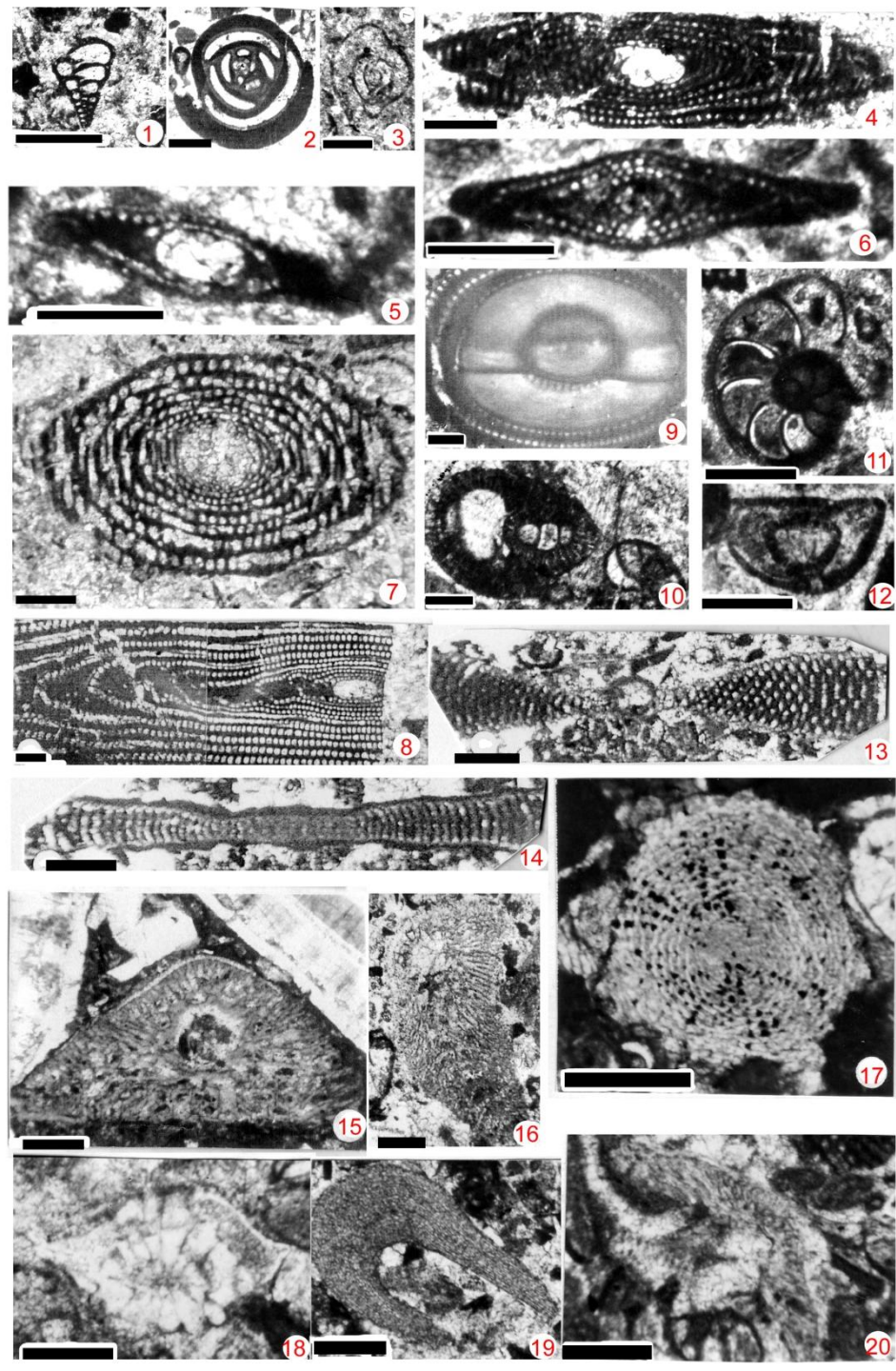


A. exponens



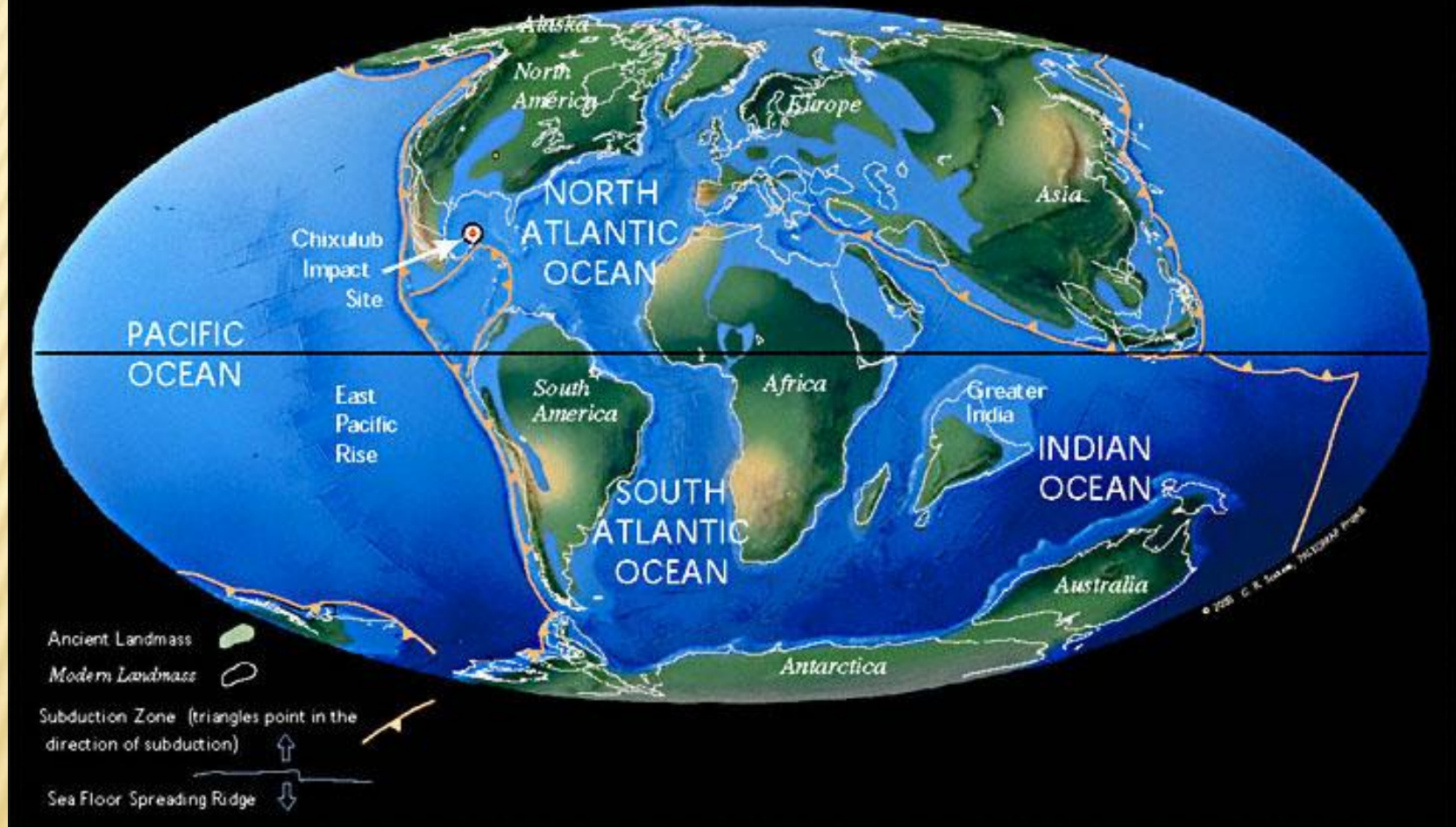






M. Görmüş,
Ankara University, 2017
Lecture 14

K/T Boundary 66 Ma



Middle Eocene 50.2 Ma



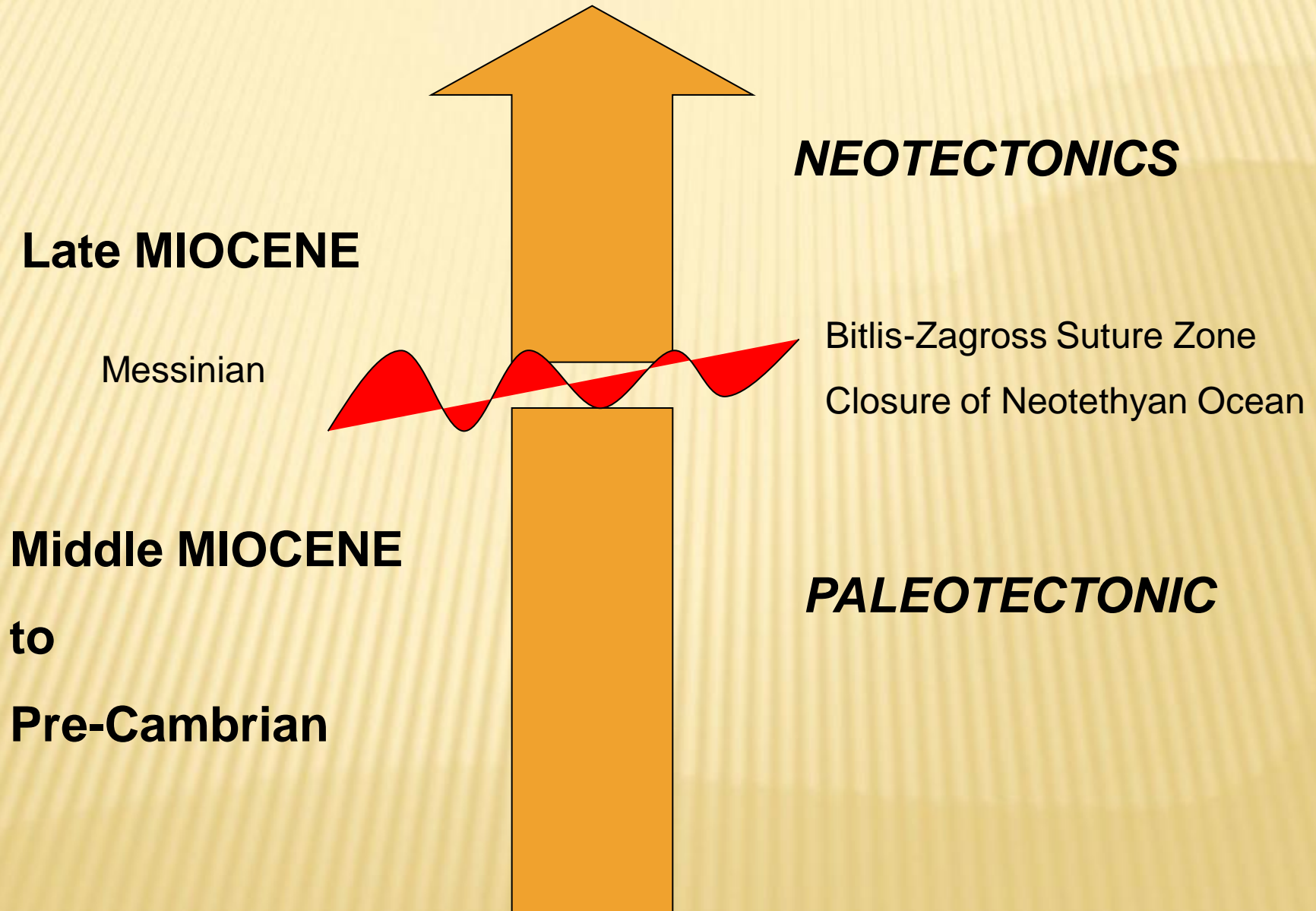
Ancient Landmass 
Modern Landmass 

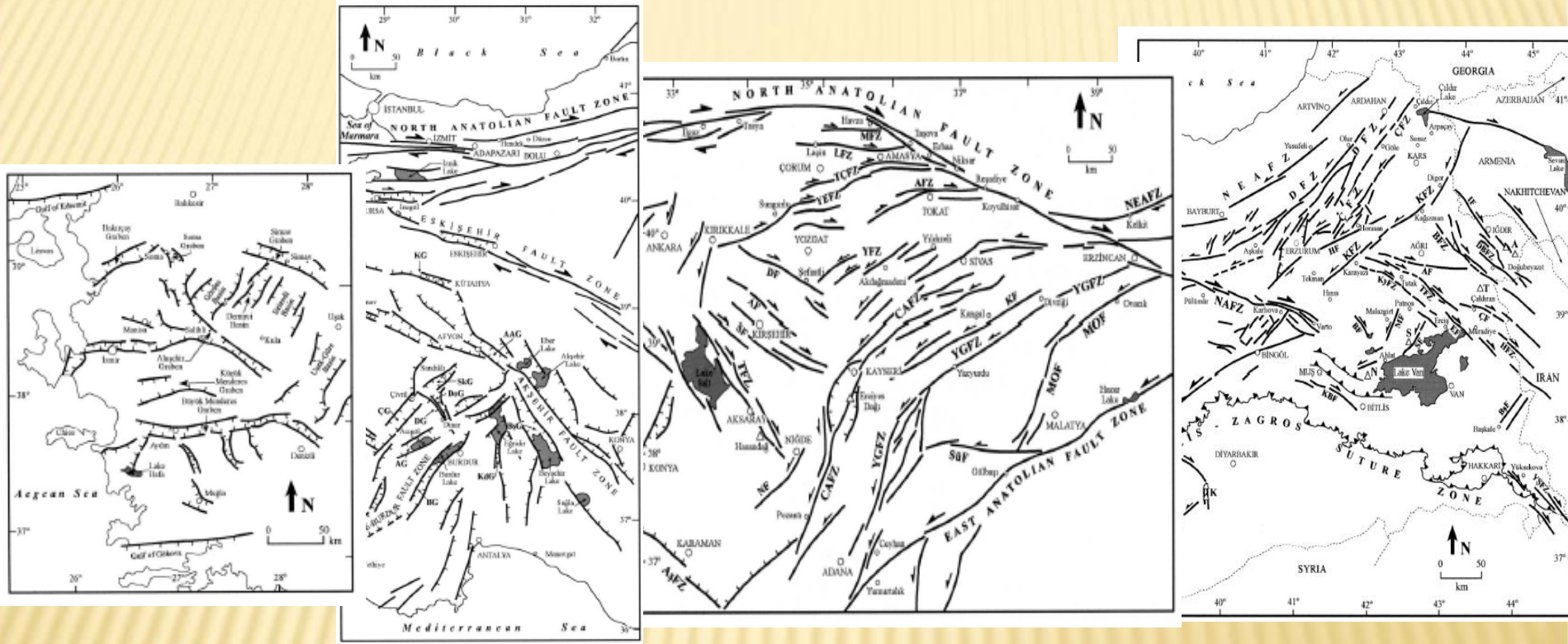
Subduction Zone (triangles point in the direction of subduction) 

Sea Floor Spreading Ridge 

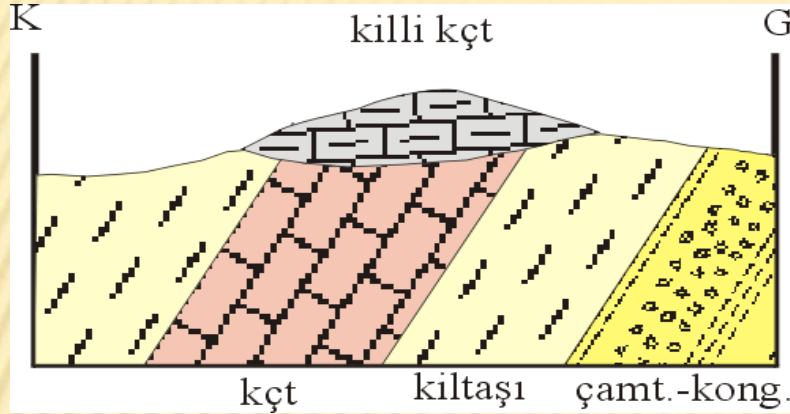
© 1995 C. R. Scotese 10131706AF 10/02

Approach to geological history





Bozkurt, 2001



Limestone: *Siderolites* sp., *Orbitoides* sp., *Hippurites* sp. *Quinqueloculina* sp., Alg

Claystone: *Globotruncana* sp., *Heterohelix* sp.,

Mudstone-Conglomerate: Altta; *Globigerina* sp. (bol), Üstte; *Nummulites* sp., *Discocyclina* sp., *Peneroplis* sp.

Clayey limestone: *Schwagerina* sp., fusulin, *Lithostratton* sp. *Syringopora* sp. fosilleri içermektedir.

HOMEWORK

QUESTION: Please find ages of stratigraphical units and interpretate their paleoenvironments and structural geology.

