

SOUTHERN TETHYS BIOFACIES



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by Dario Sartorio and Sandro Venturini
Agip Stratigraphic Department

Photos of Agip Archives

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This Atlas illustrates the most significant biofacies found in the Mediterranean, the Middle East and in Eastern Africa by AGIP during about 50 years of activity.

It represents AGIP's contribution to the on-going study of micropaleontology as applied to petroleum exploration.

Rather than being simply an update and extension of "Microfacies Italiane" (1959), this edition features completely revised material, since it was edited according to the latest stratigraphic criteria which take into account fossil paleoecology.

This undertaking is part of a long-standing AGIP tradition in developing and sharing applied knowledge in the various scientific disciplines.

"Microfacies Italiane", published by AGIP Mineraria in 1959, was highly praised both for its technical and didactic content, and like the previous Atlas of "Foraminiferi Padani" (1957) all the available copies were rapidly exhausted.

Consequently in order to satisfy the continuous demand from outside and from within our company, and to keep pace with the growth of knowledge in biostratigraphy as applied to hydrocarbon exploration, we decided to produce a completely new "Iconographic Atlas". This volume is intended for all those who wish to adopt a practical approach to the study of biofacies by means of thin sections.

The Atlas illustrates some of the most significant biofacies from the Paleozoic through the Cenozoic, selected from a far greater area than our national territory.

In addition to our data, from wells and surface sections, this work has taken into account a wide variety of comprehensive and detailed studies (biozonations, correlations, paleoenvironmental and paleogeographic reconstructions etc.) produced in recent years.

Most of the material used was selected from thousands of surface and subsurface samples of sedimentary rock collected by AGIP in the Mediterranean area, Middle East and East Africa (the "Southern Tethys Domain").

Our iconographic collection has been enriched and completed by the addition of several particularly significant biofacies provided by the Earth Sciences Departments of the Universities of Milan and Perugia and the Institute of Paleontology of the University of Naples.

In setting out to produce this volume, our aim was to give our experts and all interested biofacies scholars a practical tool for improved stratigraphic and paleoenvironmental studies.

This Atlas, promoted by our Prof. Luigi Mattavelli, was compiled in AGIP's Stratigraphic Department by Drs. Dario Sartorio and Sandro Venturini under the supervision of Drs. Achille Balduzzi and Emilio Bellini, and with the cooperation of all the stratigraphers in the unit.

We wish to express our deep appreciation to Professors Bianca Maria Cita, Camilla Pirini, Gloria Ciarapica and Filippo Barattolo who provided us with invaluable material, as well as for their suggestions, and to Professors Isabella Premoli Silva and Piero De Castro who reviewed the manuscript.

Giuseppe Muscarella
Chairman

SUMMARY

Paleontological material and the significance of the Southern Tethys Domain	8
Reading Key	10
Micropaleontological Bioevents	12
PALEOZOIC	14
TRIASSIC	40
JURASSIC	58
CRETACEOUS	88
CENOZOIC	154
BIOFACIES AND ENVIRONMENTS	216
Selected references	227
Index	233

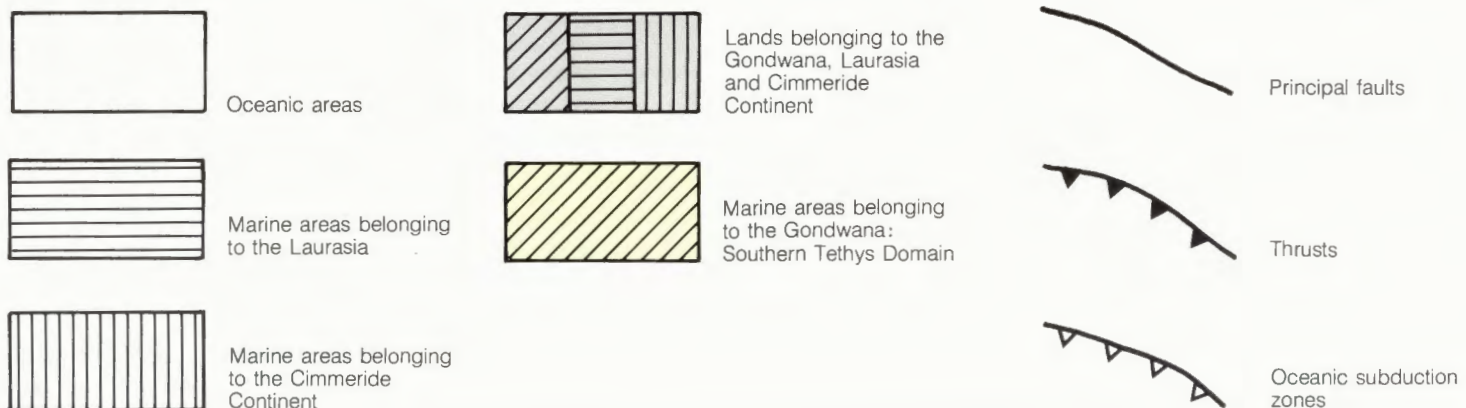
**PALEONTOLOGICAL MATERIAL
AND THE SIGNIFICANCE
OF THE SOUTHERN
TETHYS DOMAIN.**

The paleontological material was chosen on the basis of our working requirements, highlighting those biofacies useful to the exploration stratigraphy.

Therefore uncommon assemblages and rare taxa, even if of a certain significance to the specialists, were deliberately ignored. The availability of paleontological material from AGIP archive has also influenced this choice. This justifies the special attention given to the Southern Tethys Domain which is paleontologically characterized by biofacies common to our peninsula, to many Mediterranean countries, to the Middle East and Eastern Africa, with a large variety of taxa from Paleozoic to Cenozoic. The Southern Tethys Domain (Fig. 1 and 2), started developing in the



Fig. 1. LATE JURASSIC - EARLY CRETACEOUS: Southern Tethys Domain. Modified from DERCOURT *et alii* 1985 and ŞENGÖR 1984.



Early Jurassic (South neo-Tethyan margin) as a consequence of the Central Atlantic rifting. The Southern Tethys Domain is characterized by macro and micropaleontological assemblages which are often different from those found in the northern side of the Tethys. Paleontological material from Central Europe was used only for the Paleozoic. This choice is justified by considering that before the Jurassic, the Central Atlantic and the areas at present around the Western Mediterranean almost certainly belonged to a single continental landmass. Although this Atlas refers only to the Southern Tethys Domain, it contains the main microfossil groups which played an important role in the geological history of the Earth from Paleozoic to Cenozoic.

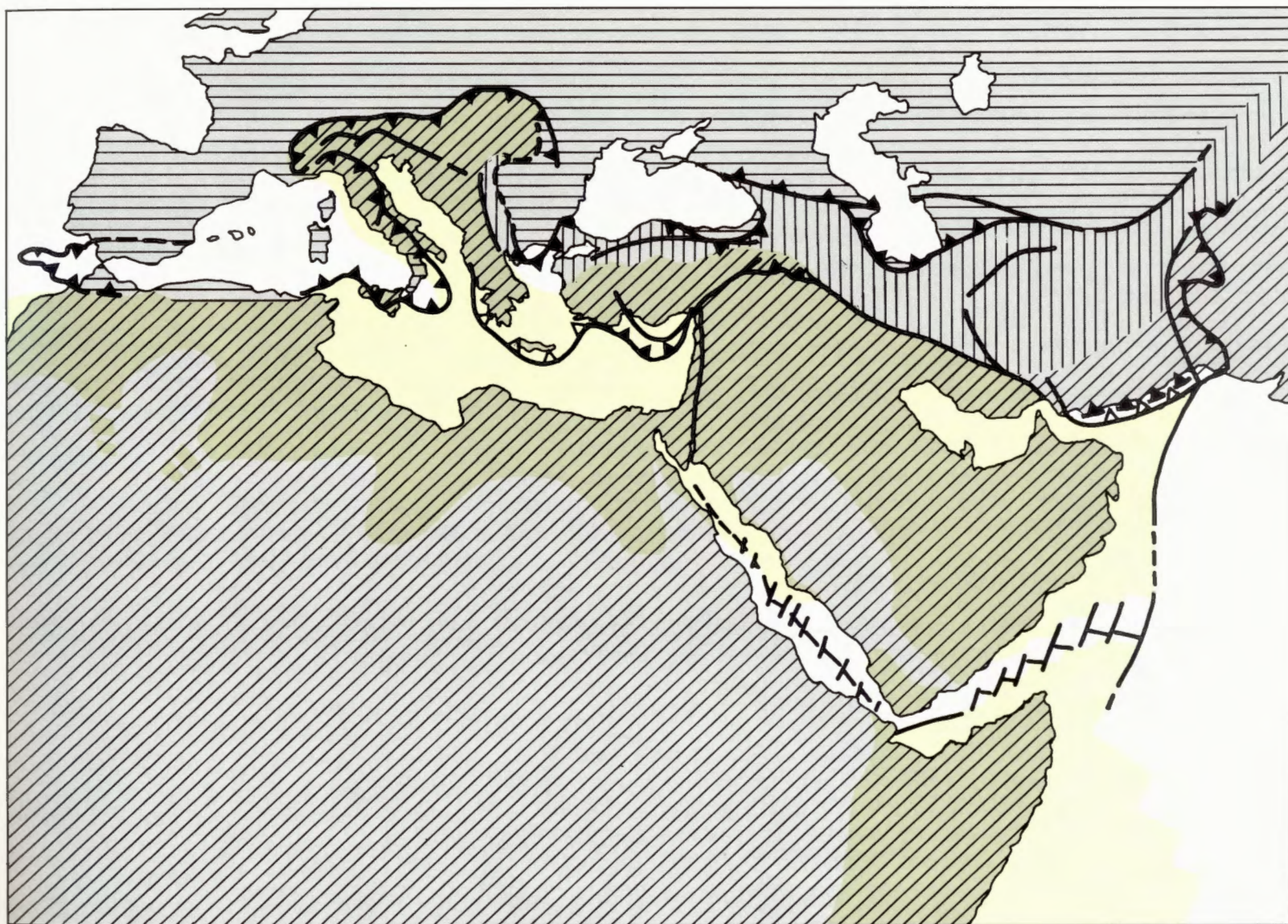
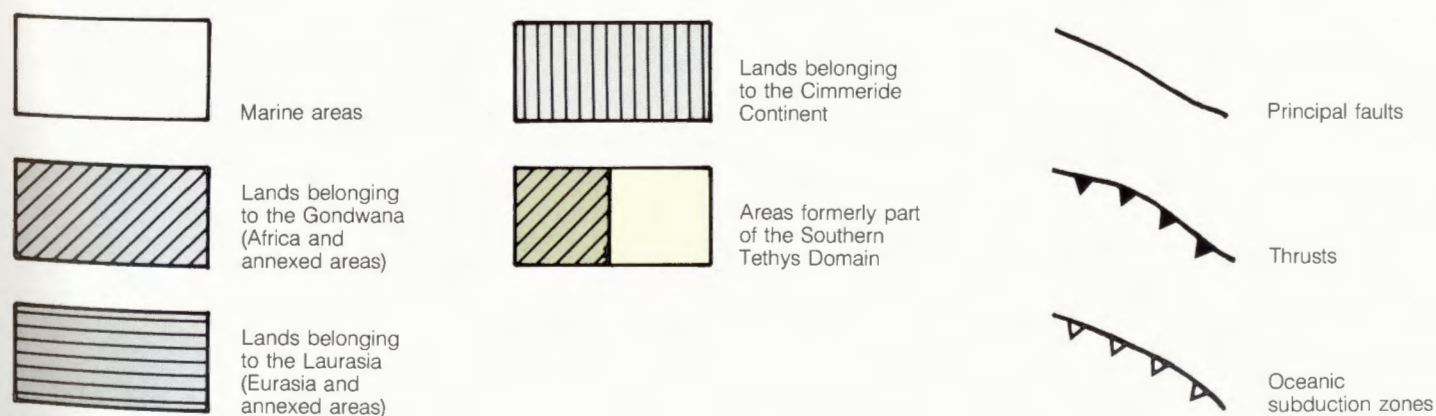


Fig. 2. **PRESENT:** Areas formerly part of the Southern Tethys Domain. Modified from DERCOURT *et alii* 1985 and ŞENGÖR 1984.



READING KEY

The contents of the Atlas are arranged in order to facilitate a rapid consultation. The following must be kept in mind:

NAMES OF FOSSILS (Fig. 3A):

The name or names of fossils are listed next to each photograph. The specific names of many forms were deliberately omitted, as focusing attention on the genus only was thought to be more useful.

AGE AND GEOGRAPHIC LOCATION (Fig. 3B):

The name of each fossil is followed by the age and geographic location of the collected sample.

RANGE OF FORMS (Fig. 3C):

The boxes containing the ages also include bold continuous lines, which define the maximum frequency range of the forms represented. Dashed bold lines represent an uncertain and/or controversial maximum frequency range. Thin lines represent the total range of the illustrated forms, while dashed thin lines represent uncertain and/or controversial total range.

NOTES AND OBSERVATIONS (Fig. 3D):

Some morphological, taxonomical, paleogeographic, etc. notes are added in order to supply further information on the illustrated fossil.

CHAPTER ARRANGEMENT:

The volume is subdivided into five chapters in stratigraphic order: Paleozoic, Triassic, Jurassic, Cretaceous and Cenozoic.

a) Within each chapter, except for the Paleozoic, various forms are presented according to their environment from shallow-water to basin. For example, while limited space is dedicated to Triassic basinal biofacies, in the Jurassic and later, pelagic biofacies are progressively examined more closely, in relation to the evolution and increasing stratigraphic importance of planktonic microfossils.

b) The first part of each chapter is dedicated to shallow platform biofacies, followed by basinal facies.

c) In the Cenozoic chapter a further distinction is made between environmentally protected and open circulation biofacies. The Cenozoic is therefore divided into protected and open shallow-water biofacies and basin biofacies.

d) The most important calcareous Algae are also included. They are grouped at the end of the shallow platform biofacies of each chapter except for those of Jurassic and Cretaceous age. These are arranged in stratigraphic order with the other different fossils of shallow platform in the Jurassic and Cretaceous chapters.

e) Many forms belonging to the same family (e.g. Fusulinidae, Duostominidae, etc.) are grouped together in summarizing tables to stress their importance as markers.

A and B

Protopreneroplis striata WEYNSCHENK (X 90).
DOGGER of Matumbi Hills, Tanzania.

C

LIAS				DOGGER				MALM		
HETTANGIAN	SINEMURIAN	PLEISENCHIAN	TOARCIAN	AALENIAN	BAJOCCAN	BATHONIAN	CALLOVIAN	OXFORDIAN	KIMMERIDGIAN	TITHONIAN
					---	---	---	---	---	---

D

Oolitic facies with *Protopreneroplis* are present in Tanzania and Madagascar. They identify the extreme southern border of the Southern Tethys Domain during the JURASSIC.

Fig. 3

BIOFACIES AND ENVIRONMENT PLATES:

The Atlas ends with eight simplified tables, in which some biofacies typical of a specific environment from the Paleozoic through the Cenozoic are summarized. Each diagram idealizes a certain number of biofaces of approximately the same age, whose paleontological content may indicate a particular environment. Bearing in mind that these diagrams are a summary, they should be considered only as tentative and not final; thus they could vary from area to area.

TABLES OF MICROPALAEONTOLOGICAL BIOEVENTS:

In these tables the most significant bioevents recognizable in thin section (e.g. the first occurrence and disappearance of the main microfossil groups) are schematically plotted in stratigraphic order. They are located before the illustrate part of the Atlas in order to avoid a micropaleontological-biostratigraphic discussion in each chapter.

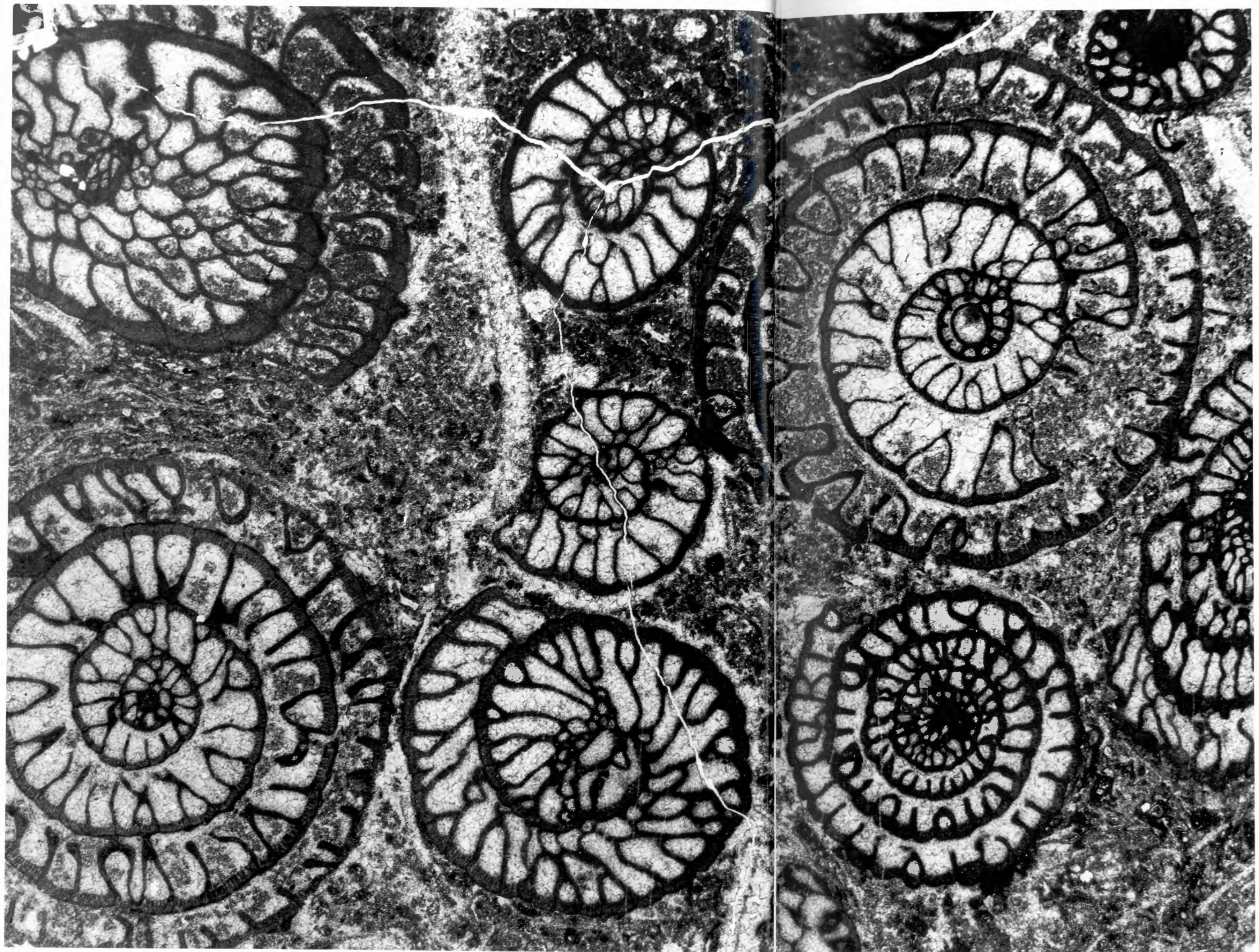
REFERENCE LIST:

A list of selected references includes some important general works to which all workers interested in biofacies and microfacies study could refer in addition to those cited in the text.

MICROPALAEONTOLOGICAL BIOEVENTS

EARLY PALEOZOIC	Primitive forms of foraminifers and algae.
EARLY CARBONIFEROUS	Occurrence and spreading of different forms of foraminifers and algae.
LATE CARBONIFEROUS-PERMIAN	Maximum spreading of <i>Fusulinidae</i> facies.
LATEST PERMIAN	Extinction of <i>Fusulinidae</i> and of nearly all the different foraminiferal genera of the Carboniferous and Permian.
PERMIAN-TRIAS BOUNDARY	Global crisis period.
SCYTHIAN-EARLY ANISIAN	Scarce fauna, prevalently <i>Ammodiscidae</i> and <i>Fischerinidae</i> .
ANISIAN	Occurrence of <i>Duostominidae</i> .
LATEST ANISIAN-LADINIAN	<i>Diploporella annulata</i> and <i>Teutloporella nodosa</i> algal facies.
LADINIAN-CARNIAN	Occurrence and spreading of <i>Triadodiscus</i> and <i>Lamelliconus</i> .
NORIAN-RHAETIAN	Maximum spreading and differentiation of <i>Involutinacea</i> superfamily.
RHAETIAN	Occurrence of <i>Triasina hantkeni</i> .
LATEST RHAETIAN	Extinction of <i>Duostominidae</i> .
EARLY LIAS	<i>Involutinacea</i> is present with new forms (<i>Involutina liassica</i> etc.).
MIDDLE LIAS	Significant spreading of <i>Valvulinidae</i> facies. <i>Orbitopsella</i> and <i>Palaeoclasysdodus</i> facies.
DOGGER	Occurrence of <i>Protopeneroplis striata</i> . Occurrence and evolution of <i>Pfenderinidae</i> . Occurrence of first planktonic foraminiferal facies.
MALM	Disappearance of <i>Pfenderina</i> and occurrence of <i>Kurnubia</i> .
LATE MALM	Spreading of <i>Clypeina jurassica</i> . Occurrence of first <i>Calpionellidae</i> , preceded by the <i>Saccocoma</i> facies.
EARLIEST CRETACEOUS	Maximum spreading of <i>Calpionellidae</i> facies.
EARLY CRETACEOUS	Occurrence of <i>Cuneolina</i> .
VALANGINIAN	Extinction of <i>Calpionellidae</i> .
LATEST BARREMIAN-EARLY APTIAN	Significant spreading of <i>Orbitolinidae</i> (<i>Paleodictyoconus</i> , <i>Palorbitolina</i> , etc.). Constant occurrence of planktonic foraminifers.
LATE APTIAN	Most primitive <i>Alveolinidae</i> . Spreading of planktonic foraminiferal facies.
ALBIAN	Start of first significant <i>Miliolidae</i> facies. Planktonic assemblages, in which <i>Ticinella</i> and <i>Hedbergella</i> prevail.
LATEST ALBIAN	Spreading of <i>Cuneolina pavonia</i> and new <i>Orbitolinidae</i> (<i>Neoiragia</i> , etc.). Occurrence of <i>Rotalipora</i> and <i>Planomalina buxtorfi</i> .

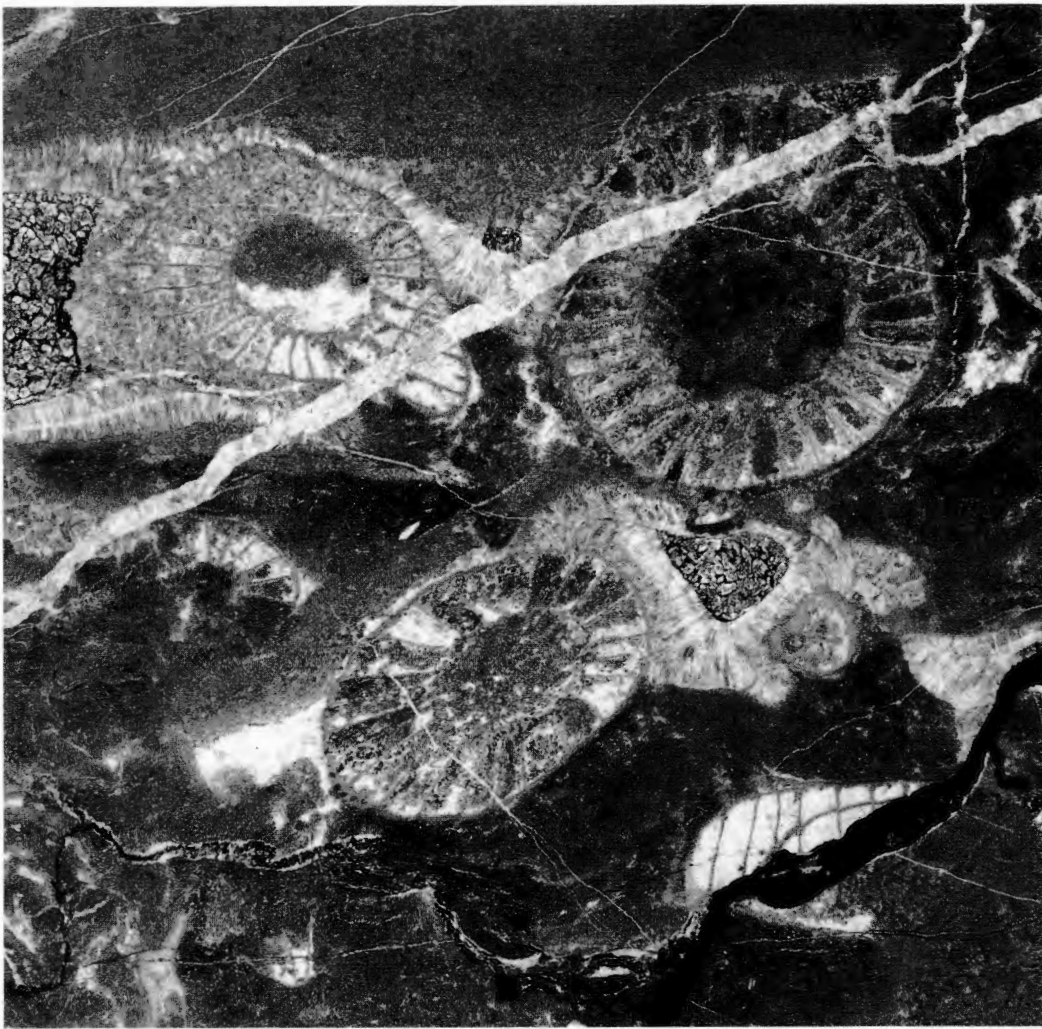
CENOMANIAN	Maximum diversification and spreading of <i>Nezzazatidae</i> . Occurrence of new <i>Alveolinidae</i> (<i>Praealveolina</i> , <i>Sellialveolina</i> , etc.). Spreading of <i>Rotalipora</i> .
MIDDLE CENOMANIAN	Extinction of <i>Orbitolina</i> genus.
CENOMANIAN-TURONIAN BOUNDARY	Reduction in benthonic fauna and decrease in keeled forms of planktonic foraminifers.
LATE TURONIAN-CONIACIAN	Start of significant spreading of double-keeled planktonic foraminifers (<i>Marginotruncana</i> , <i>Dicarinella</i>).
CONIACIAN-SANTONIAN	Maximum spreading of <i>Dicyclina</i> facies.
LATEST SANTONIAN	First occurrence of <i>Orbitoides</i> .
CAMPANIAN	New development in single-keeled planktonic foraminifers (<i>Globotruncana elevata</i> , <i>Globotruncana stuartiformis</i> , etc.).
MAASTRICHTIAN	Significant spreading of <i>Orbitoididae</i> and <i>Siderolites</i> . Maximum development and spreading of large <i>Heterohelicidae</i> and high-trochospiral planktonic foraminifers (<i>Globotruncana contusa</i>).
CRETACEOUS-TERTIARY BOUNDARY	Extinction of <i>Orbitoididae</i> and <i>Globotruncanidae</i> .
EARLIEST PALEOCENE	Small globigerinids followed by globular <i>Globorotaliidae</i> facies.
LATE PALEOCENE	<i>Glomalveolina</i> , <i>Coskinolina</i> , and <i>Fallotella</i> facies. Occurrence of <i>Discocyclina</i> , <i>Nummulites</i> and <i>Orbitolites</i> .
EARLY EOCENE	Maximum spreading of <i>Alveolina</i> facies. Significant development of ornamented planktonic foraminifers (<i>Morozovella subbotinae</i> , <i>Morozovella formosa</i> , etc.).
MIDDLE EOCENE	Maximum spreading of <i>Nummulites</i> facies. Occurrence of <i>Hantkenina</i> , <i>Globigerinatheka</i> , and <i>Turborotalia</i> gr. <i>cerroazulensis</i> .
MIDDLE-LATE EOCENE BOUNDARY	Disappearance of <i>Alveolina</i> facies. Extinction of ornamented planktonic forms.
LATE EOCENE	<i>Spiroclypeus</i> / <i>Pellatispira</i> facies.
EOCENE-OLIGOCENE BOUNDARY	Disappearance of <i>Discocyclina</i> . Extinction of <i>Turborotalia</i> gr. <i>cerroazulensis</i> , <i>Hantkenina</i> and <i>Globigerinatheka</i> .
EARLY OLIGOCENE	Last significant <i>Nummulites</i> facies.
MIDDLE OLIGOCENE	Occurrence of <i>Lepidocyclinidae</i> . Significant spreading of <i>Meandropsina</i> , <i>Archaias</i> and <i>Austrotrillina</i> facies.
LATEST OLIGOCENE	Occurrence of <i>Miogypsinoidea</i> .
EARLY MIOCENE	Occurrence of <i>Miogypsina</i> . Spreading of <i>Globigerinoides</i> and <i>Globoquadrina</i> .
EARLY-MIDDLE MIOCENE BOUNDARY	Extinction of <i>Lepidocyclinidae</i> .
MIDDLE-LATE MIOCENE	<i>Borelis</i> facies. <i>Orbulina</i> facies.



PALEOZOIC

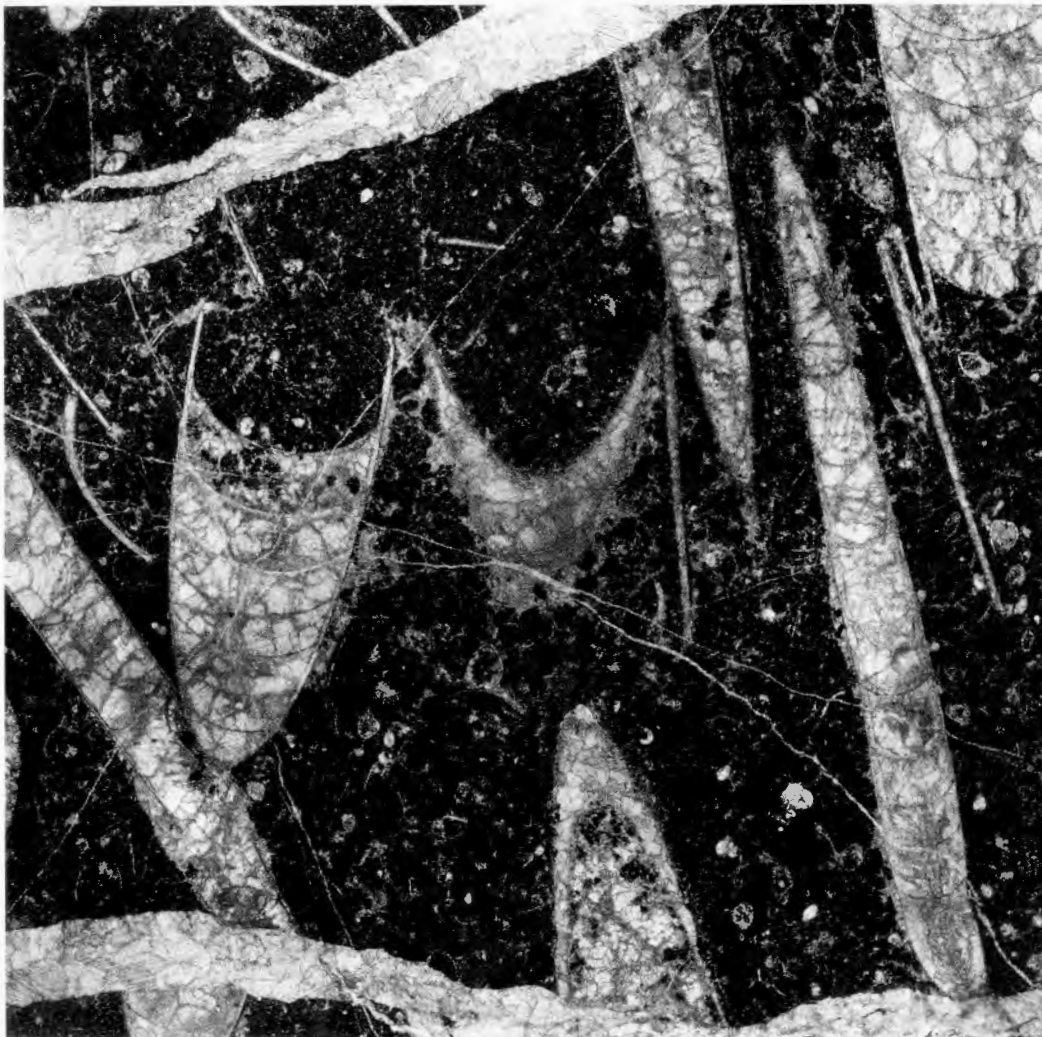
PERIOD	EPOCH		AGE (or EPOCH)*	Ma
Agip: (modified from Harland <i>et Al.</i> 1982)				
PERMIAN	LATE		TATARIAN	250
			KAZANIAN	253
	EARLY		UFIMIAN	255
			KUNGURIAN	258
			ARTINSKIAN	263
			SAKMARIAN	268
CARBONIFEROUS	LATE	LATE	ASSELIAN	280
			GZELIAN	286
		MIDDLE	KASIMOVIAN	291
			MOSCOVIAN	296
	EARLY	BASHKIRIAN		310
				320
		SERPUKHOVIAN		333
			VISEAN	
		TOURNAISIAN		
			DEVONIAN	LATE
FRASNIAN	374			
MIDDLE	GIVETIAN	380		
	EIFELIAN	387		
EARLY	EMSIAN	394		
	SIEGENIAN	401		
	GEDINNIAN	408		
	SILURIAN	LATE		PRIDOLI
LUDLOW			421	
EARLY		WENLOCK	426	
		LLANDOVERY	438	
ORDOVICIAN	LATE	ASHGILL	448	
		CARADOC	458	
	EARLY	LLANDEILO	468	
		LLANVIRN	478	
		ARENIG	488	
		TREMADOC		
		CAMBRIAN	LATE	
MIDDLE			525	
EARLY			540	

* ORDOVICIAN, SILURIAN and CARBONIFEROUS



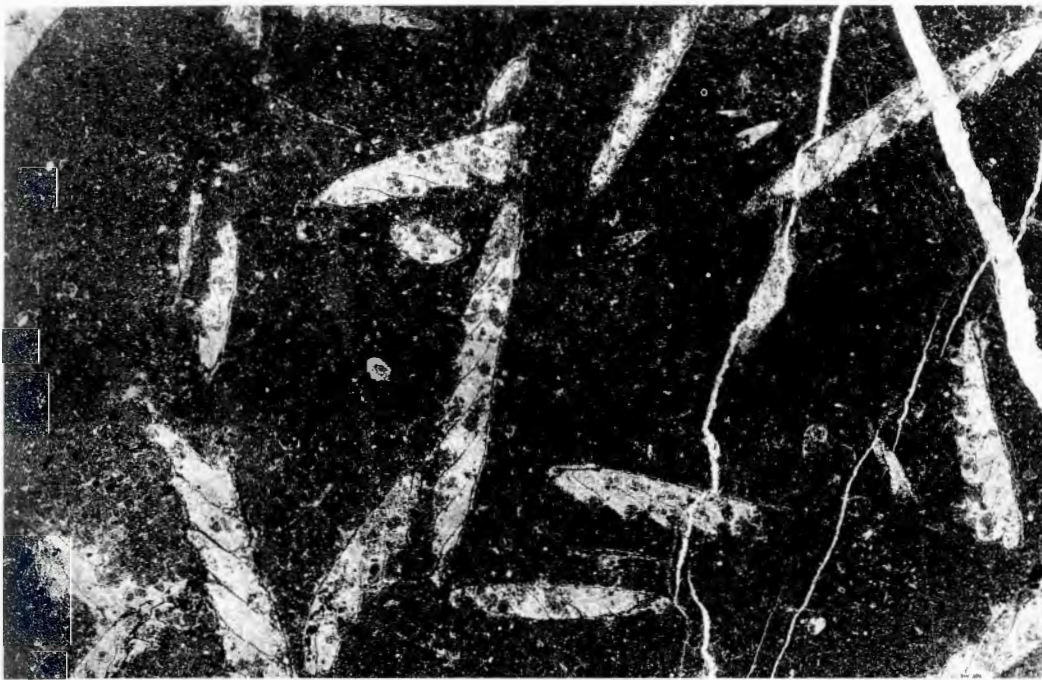
Archaeocyathids (X 4).
CAMBRIAN of Monte S. Pietro, Iglesias,
Sardinia, Italy.

CAMBRIAN			ORDOVICIAN		SILURIAN		DEVONIAN		CARBONIFEROUS		PERMIAN		
E	M	L	E	L	E	L	E	M	L	E	L	E	L



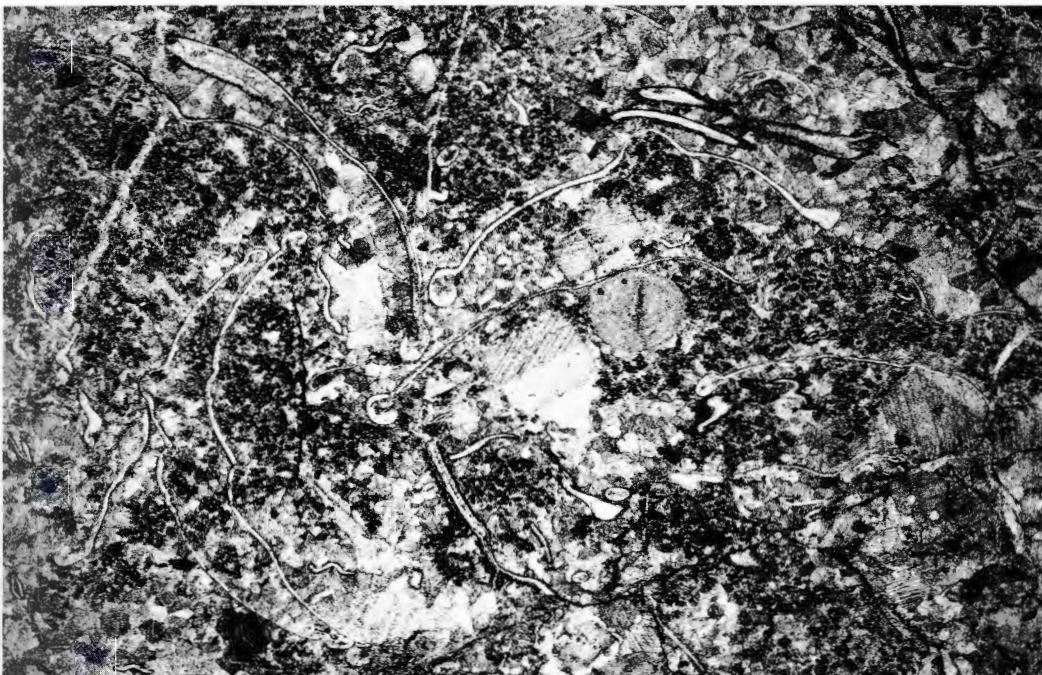
Orthoceratids (X 8).
SILURIAN of Xea di S. Antonio, Sardinia,
Italy.

CAMBRIAN			ORDOVICIAN		SILURIAN		DEVONIAN		CARBONIFEROUS		PERMIAN		
E	M	L	E	L	E	L	E	M	L	E	L	E	L



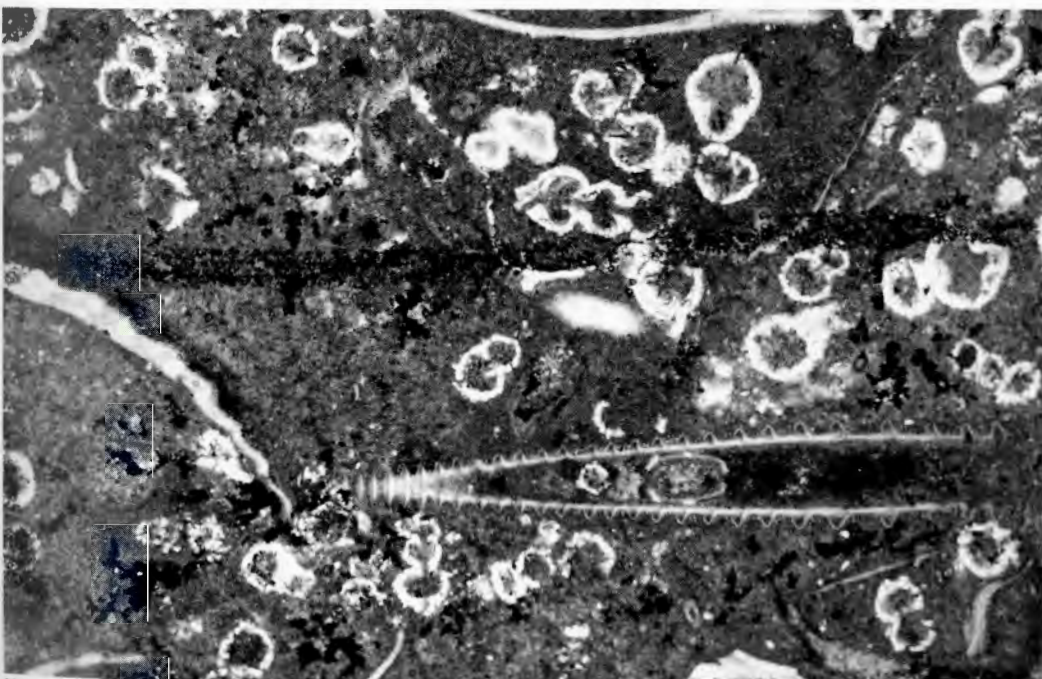
Graptolites (X 6).
SILURIAN of Xea di S. Antonio, Sardinia,
Italy.

CAMBRIAN			ORDOVICIAN		SILURIAN		DEVONIAN			CARBONIFEROUS		PERMIAN	
E	M	L	E	L	E	L	E	M	L	E	L	E	L



Trilobites (X 5).
SILURIAN of Monte Lodin, Friuli, Italy.

CAMBRIAN			ORDOVICIAN		SILURIAN		DEVONIAN			CARBONIFEROUS		PERMIAN	
E	M	L	E	L	E	L	E	M	L	E	L	E	L



Tentaculites. Hormosinidae are also
present (X 13).
DEVONIAN of Morocco.

CAMBRIAN			ORDOVICIAN		SILURIAN		DEVONIAN			CARBONIFEROUS		PERMIAN	
E	M	L	E	L	E	L	E	M	L	E	L	E	L

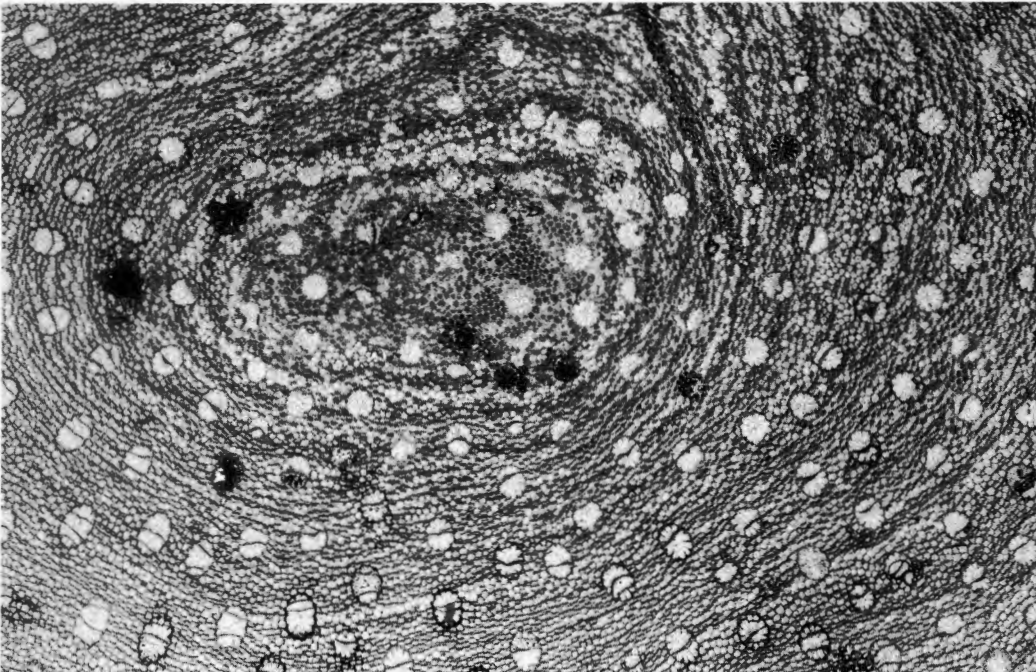
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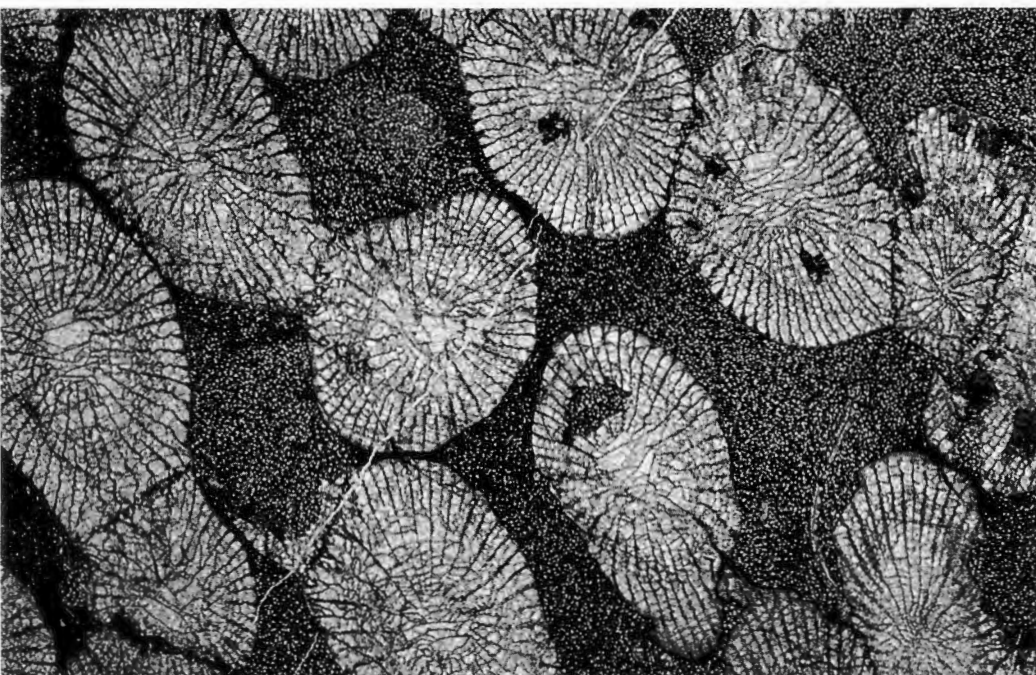
Styliolina (X 15).
DEVONIAN of Tunisia.

CAMBRIAN			ORDOVICIAN		SILURIAN		DEVONIAN		CARBONIFEROUS		PERMIAN		
E	M	L	E	L	E	L	E	M	L	E	L	E	L



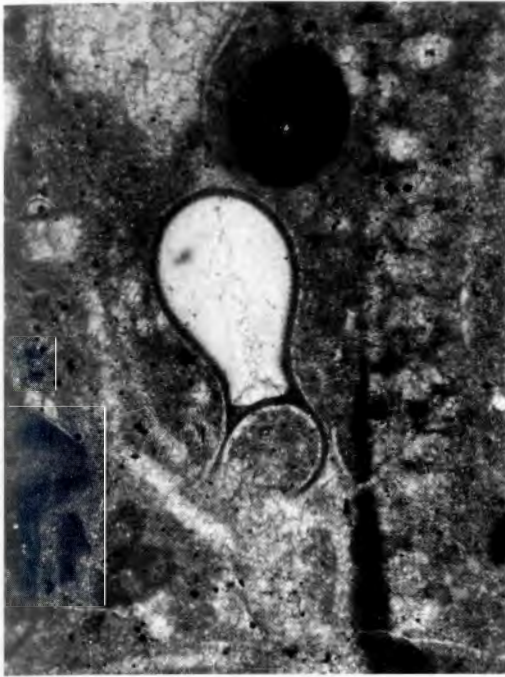
Heliolites (X 4).
DEVONIAN of Dinant, Belgium.

CAMBRIAN			ORDOVICIAN			SILURIAN			DEVONIAN			CARBONIFEROUS			PERMIAN		
E	M	L	E	L		E	L		E	M	L	E	L		E	L	



Tetracorals (X 3).
DEVONIAN of Dinant, Belgium.

CAMBRIAN			ORDOVICIAN		SILURIAN		DEVONIAN			CARBONIFEROUS		PERMIAN	
E	M	L	E	L	E	L	E	M	L	E	L	E	L
							■			■		■	



Tuberitina (X 50) (left).
UPPER CARBONIFEROUS of Monte
Pizzul, Friuli, Italy.

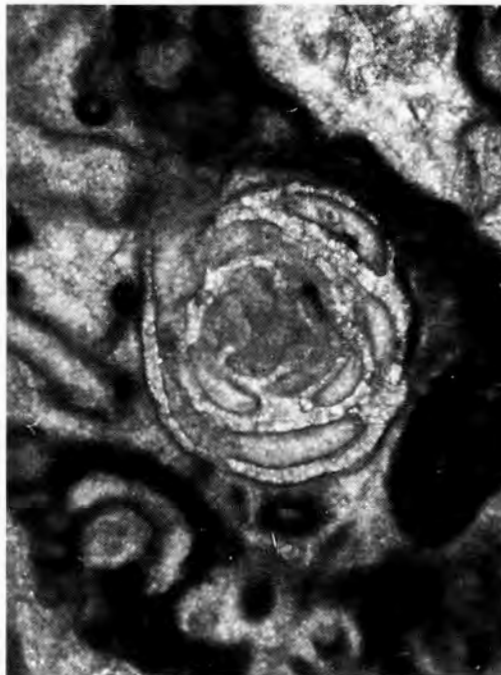


Tuberitina (X 75) (right).
LOWER PERMIAN of Amanda 1 bis well,
Adriatic Sea.

CAMBRIAN			ORDOVICIAN		SILURIAN		DEVONIAN		CARBONIFEROUS		PERMIAN		
E	M	L	E	L	E	L	E	M	L	E	L	E	L



Archaediscus (X 100) (left).
LOWER CARBONIFEROUS of G1-82 well,
Sirte Basin.

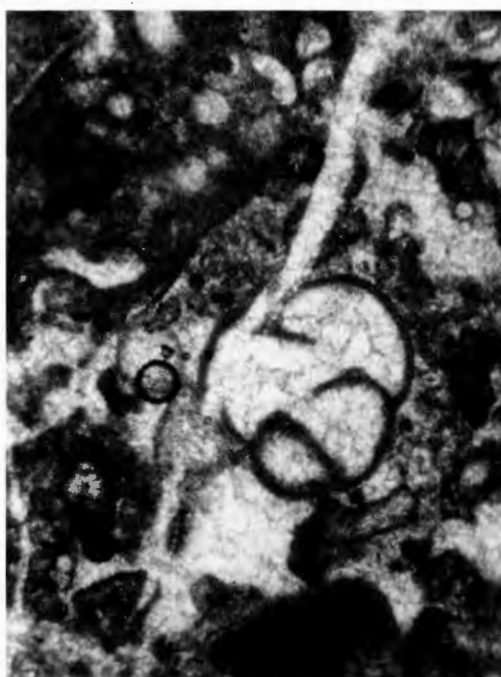


Archaediscus (X 70) (right).
LOWER PERMIAN of Amanda 1 bis well,
Adriatic Sea.

CAMBRIAN			ORDOVICIAN		SILURIAN		DEVONIAN			CARBONIFEROUS		PERMIAN	
E	M	L	E	L	E	L	E	M	L	E	L	E	L

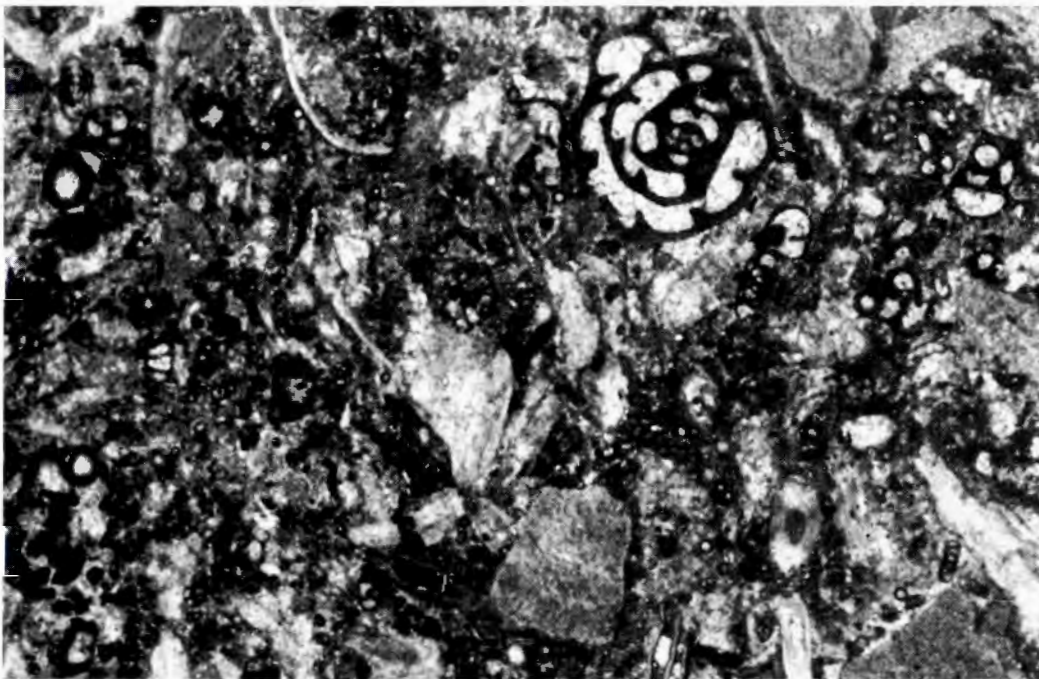


Globivalvulina (X 50) (left).
LOWER PERMIAN of Amanda 1 bis well,
Adriatic Sea.



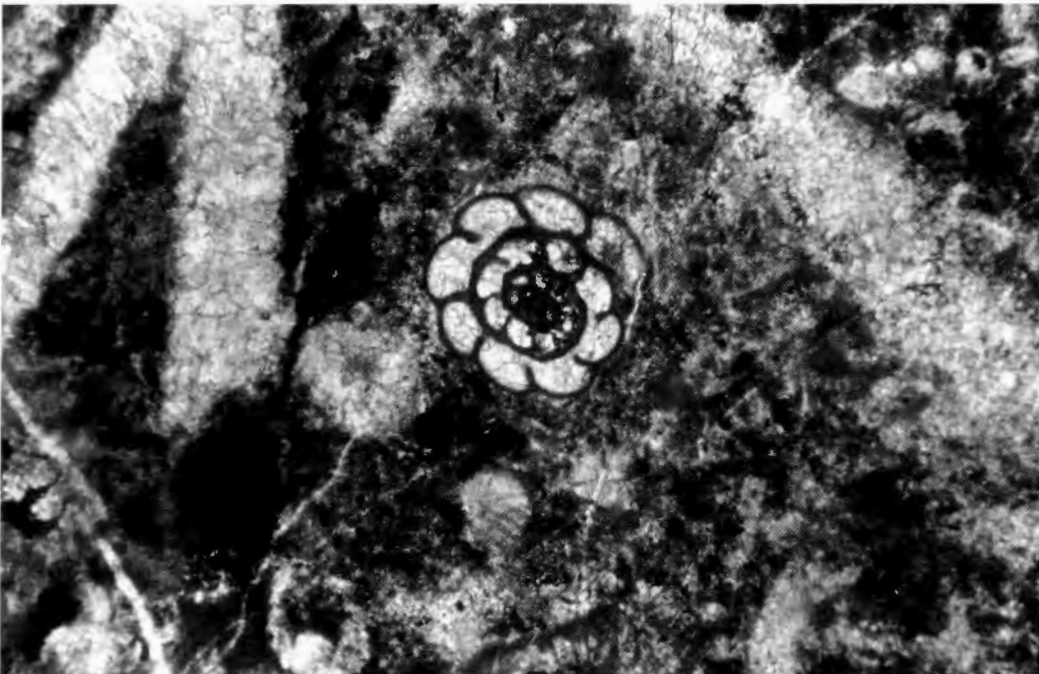
Globivalvulina (X 70) (right).
LOWER PERMIAN of Amanda 1 bis well,
Adriatic Sea.

CAMBRIAN			ORDOVICIAN		SILURIAN		DEVONIAN		CARBONIFEROUS				
E	M	L	E	L	E	L	E	M	L	E	L	E	L



Endothyridae (X 60).
CARBONIFEROUS of Southern Morocco.

CAMBRIAN			ORDOVICIAN		SILURIAN		DEVONIAN		CARBONIFEROUS		PERMIAN		
E	M	L	E	L	E	L	E	M	L	E	L	E	L
										■			



Endothyridae (X 100).
UPPER CARBONIFEROUS of Monte
Pizzul, Friuli, Italy.



Bradyina (X 40).
UPPER CARBONIFEROUS of Monte
Pizzul, Friuli, Italy.

CAMBRIAN			ORDOVICIAN		SILURIAN		DEVONIAN			CARBONIFEROUS		PERMIAN	
E	M	L	E	L	E	L	E	M	L	E	L	E	L
										■			

Opposite page
Bradyina. *Fusulinidae*, *Calcitornella*,
Cornuspira and crinoids are present
(X 30).
UPPER CARBONIFEROUS of Monte
Auernig Friuli, Italy.





Wall structures in the *Fusulinidae*; diaphanothecal layer (X 70) (left) and keriothecal layer (X 60) (right).

CAMBRIAN			ORDOVICIAN			SILURIAN			DEVONIAN			CARBONIFEROUS			PERMIAN		
E	M	L	E	L		E	L		E	M	L	E	L		E	L	

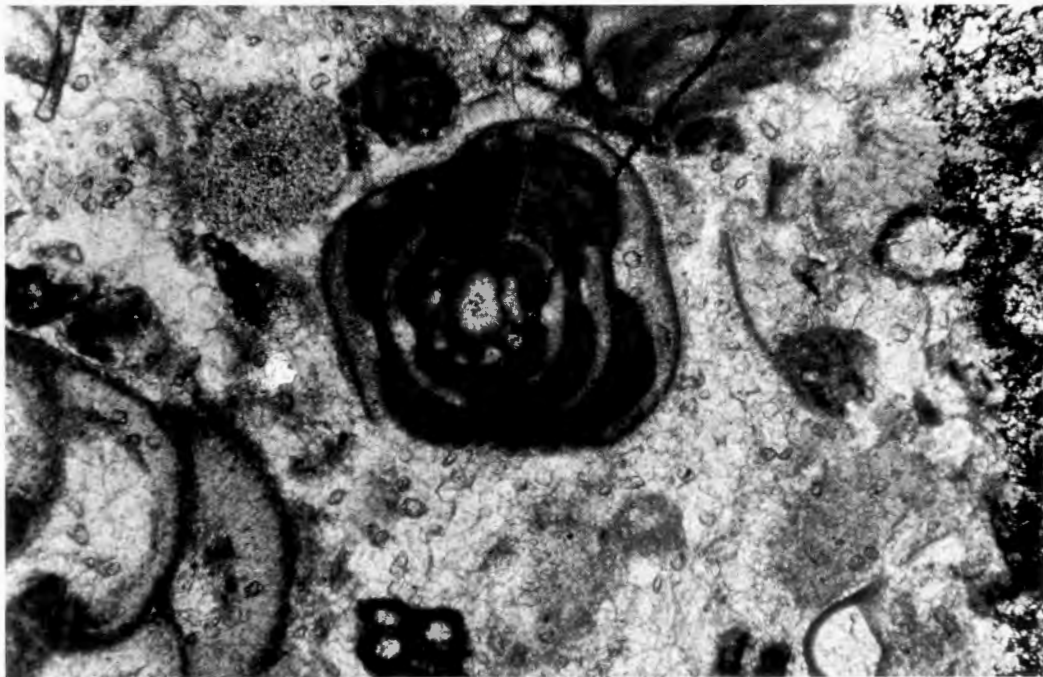
Fusulinidae descend from the *Endothyridae*.



Ozawainella (X 60). UPPER CARBONIFEROUS of Monte Auernig, Friuli, Italy.

CAMBRIAN			ORDOVICIAN			SILURIAN			DEVONIAN			CARBONIFEROUS			PERMIAN		
E	M	L	E	L		E	L		E	M	L	E	L		E	L	

A typical *Fusulinid* with primitive features.

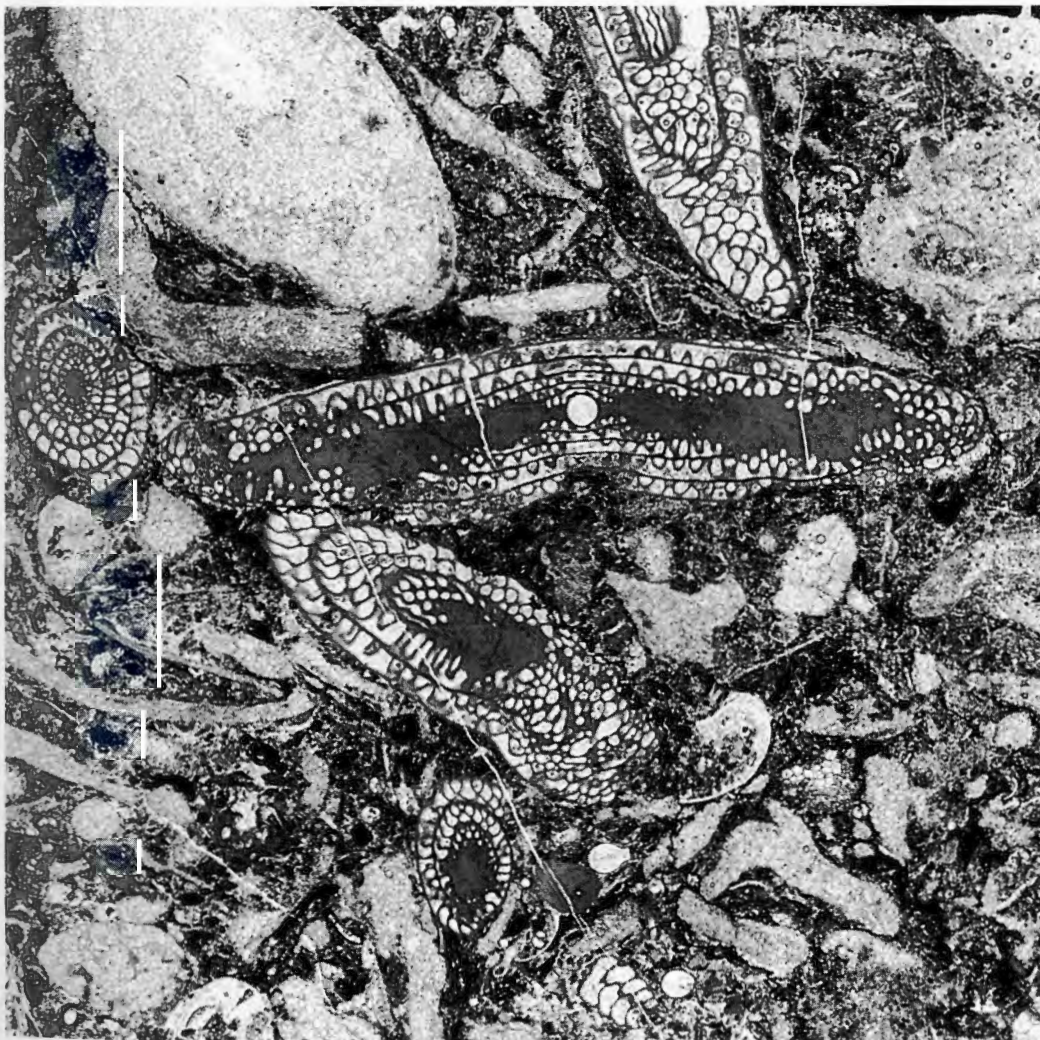


Neostaffella (X 30). UPPER CARBONIFEROUS of Turkey.

CAMBRIAN			ORDOVICIAN			SILURIAN			DEVONIAN			CARBONIFEROUS			PERMIAN		
E	M	L	E	L		E	L		E	M	L	E	L		E	L	



Fusulinidae (*Wedekindellina*), *Ozawainella*, *Calcitornella*, and crinoids (X 25).
UPPER CARBONIFEROUS of Monte Auernig, Friuli, Italy.



Fusulinidae (*Quasifusulina*), *Tuberitina*, *Paleotextulariidae*, brachiopods and *Archaeolithophyllum* (X 10).
UPPER CARBONIFEROUS of Monte Pizzul, Friuli, Italy.

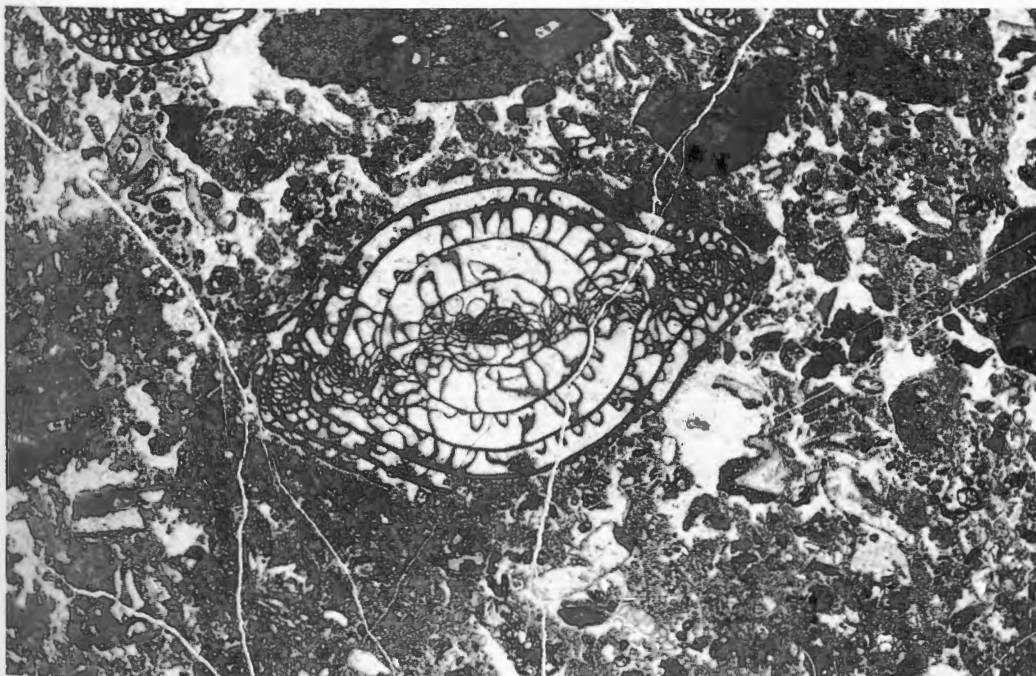




Opposite page
Schwagerinidae, *Climacammina*,
Calcitornella, crinoids, *Epimastopora* and
 algae (X 15).
 UPPER CARBONIFEROUS of Monte
 Auernig, Friuli, Italy.

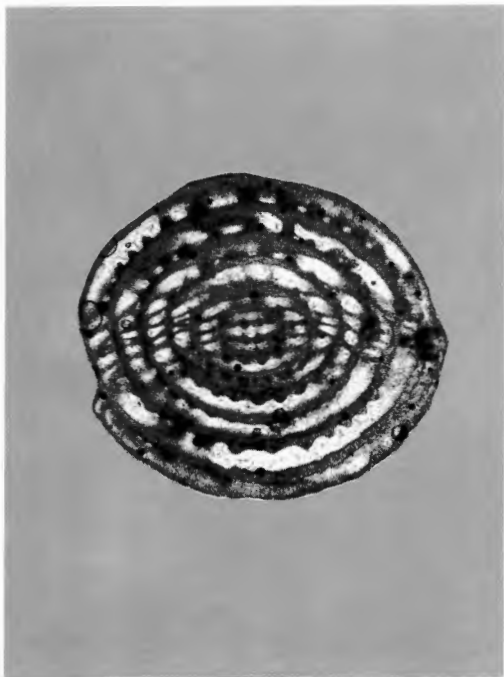
Schwagerinidae (X 5).
 LOWER PERMIAN of Carnic Alps, Friuli,
 Italy.

CAMBRIAN	ORDOVICIAN	SILURIAN	DEVONIAN	CARBONIFEROUS	PERMIAN
E M L	E L	E L	E M L	E L	E L



Alpinoschwagerina stachei (F. & G. KAHLER).
Schwagerinidae and *Tubiphytes* are
 present (X 6).
 LOWER PERMIAN of Amanda 1 bis well,
 Adriatic Sea.

CAMBRIAN	ORDOVICIAN	SILURIAN	DEVONIAN	CARBONIFEROUS	PERMIAN
E M L	E L	E L	E M L	E L	E L

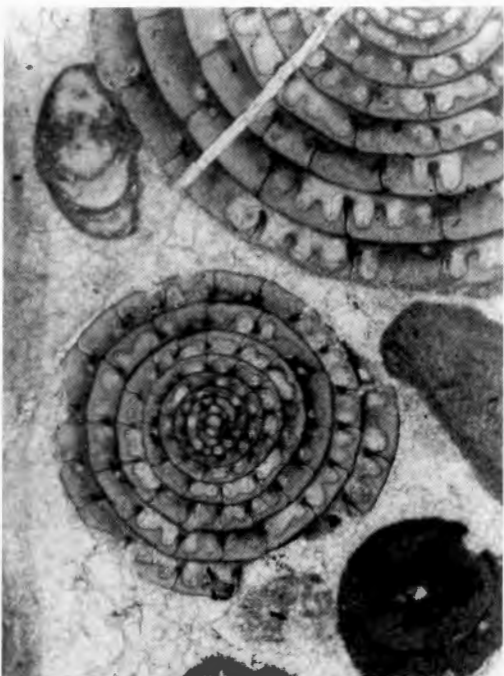


Verbeekina (X 9) (left).
LOWER PERMIAN of Amanda 1 bis well,
Adriatic Sea.

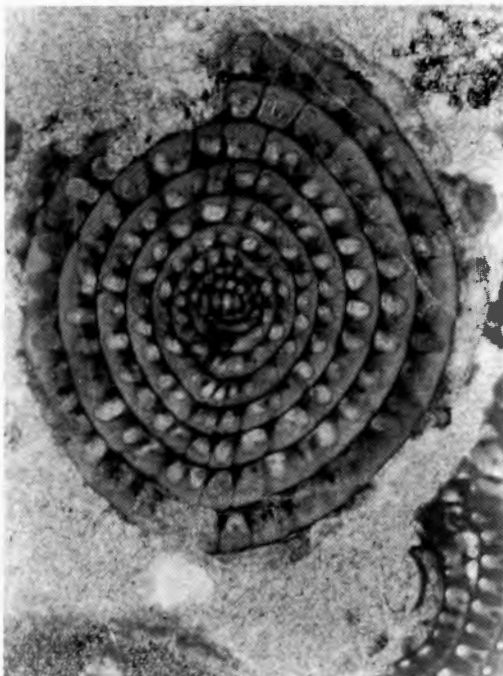


Verbeekina (X 10) (right).
UPPER PERMIAN of Sosio Valley, Sicily,
Italy.

CAMBRIAN			ORDOVICIAN			SILURIAN			DEVONIAN			CARBONIFEROUS			PERMIAN		
E	M	L	E	L		E	L		E	M	L	E	L		E	L	

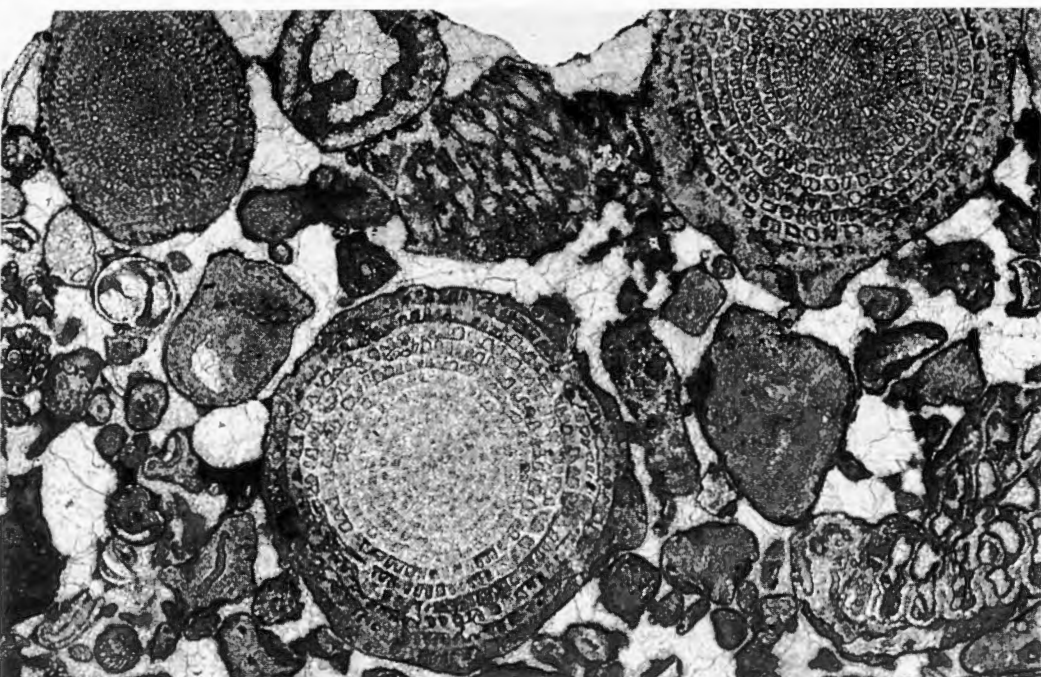


Neoschwagerina (X 20) (left).
UPPER PERMIAN of Crna Gora,
Yugoslavia.



Neoschwagerina (X 30) (right).
UPPER PERMIAN of Crna Gora,
Yugoslavia.

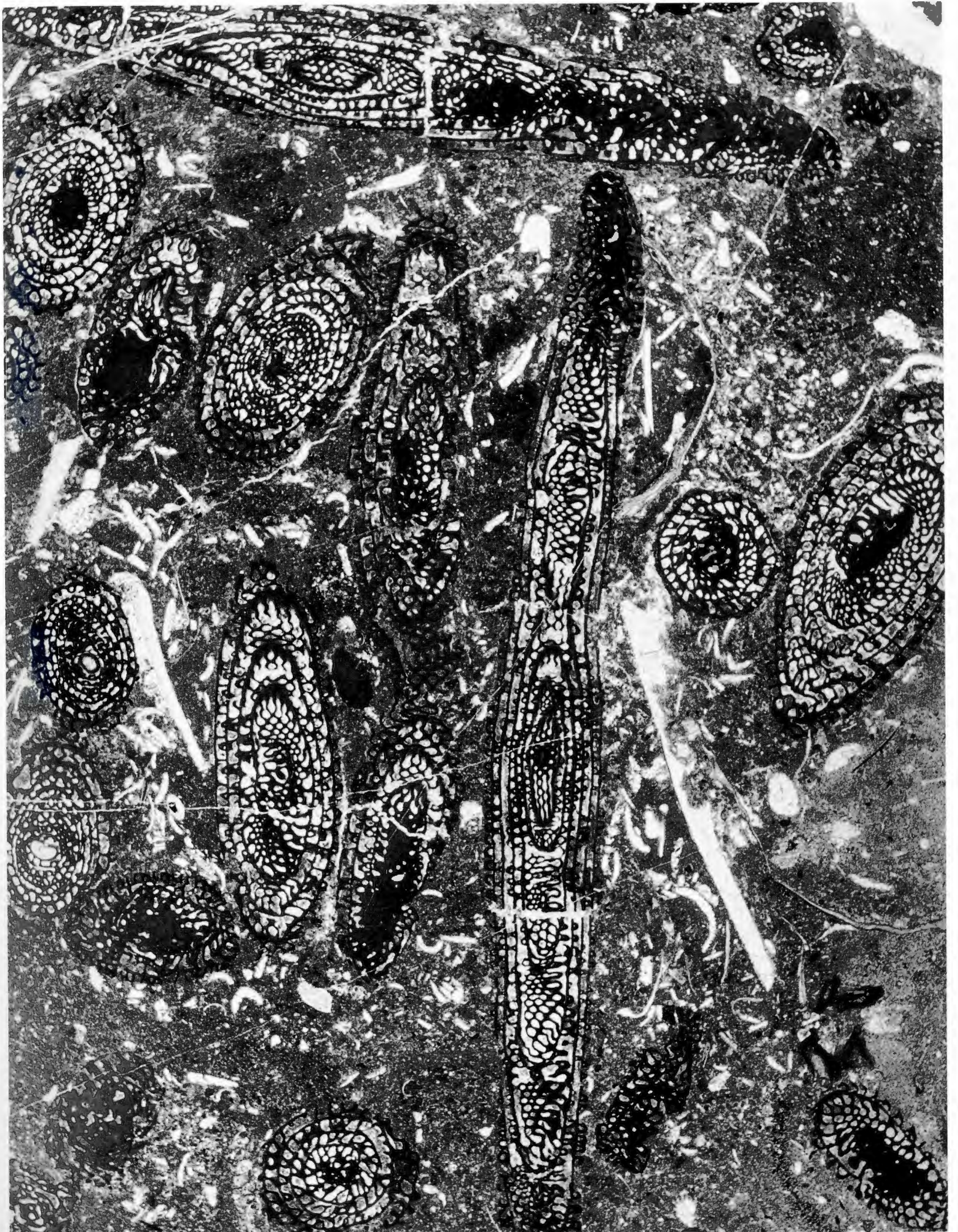
CAMBRIAN			ORDOVICIAN			SILURIAN			DEVONIAN			CARBONIFEROUS			PERMIAN		
E	M	L	E	L		E	L		E	M	L	E	L		E	L	

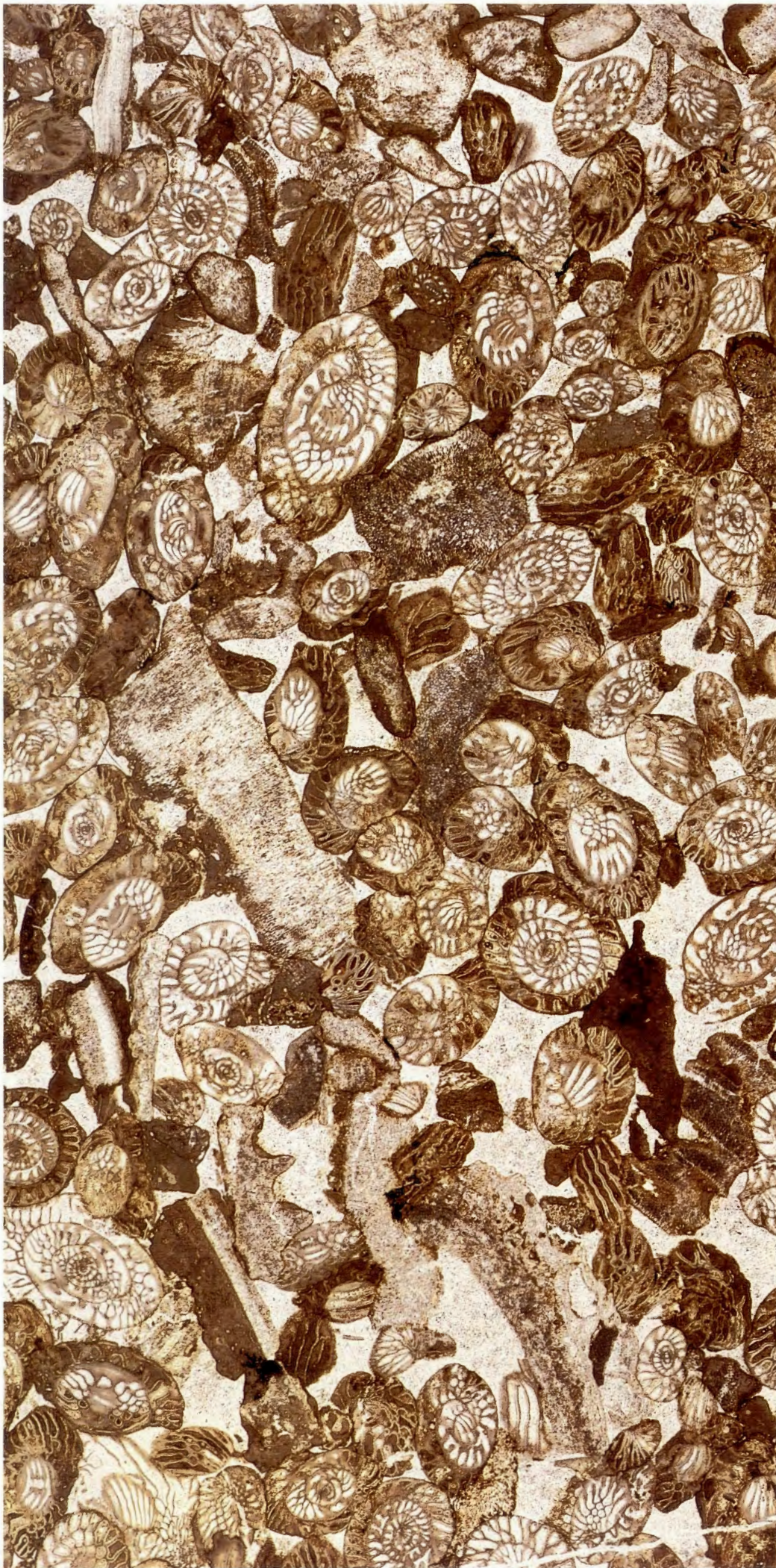


Neoschwagerina (X 12).
UPPER PERMIAN of Paklonica Velika,
Yugoslavia.

Opposite page
Polydixodina and *Schwagerinidae* (X 12).
UPPER PERMIAN of Kuh-e-Dinar, Zagros,
Iran.

CAMBRIAN			ORDOVICIAN			SILURIAN			DEVONIAN			CARBONIFEROUS			PERMIAN		
E	M	L	E	L		E	L		E	M	L	E	L		E	L	





Dunbarula mathieui CIRY (X 15).
UPPER PERMIAN of Jebel Tebaga,
Tunisia.

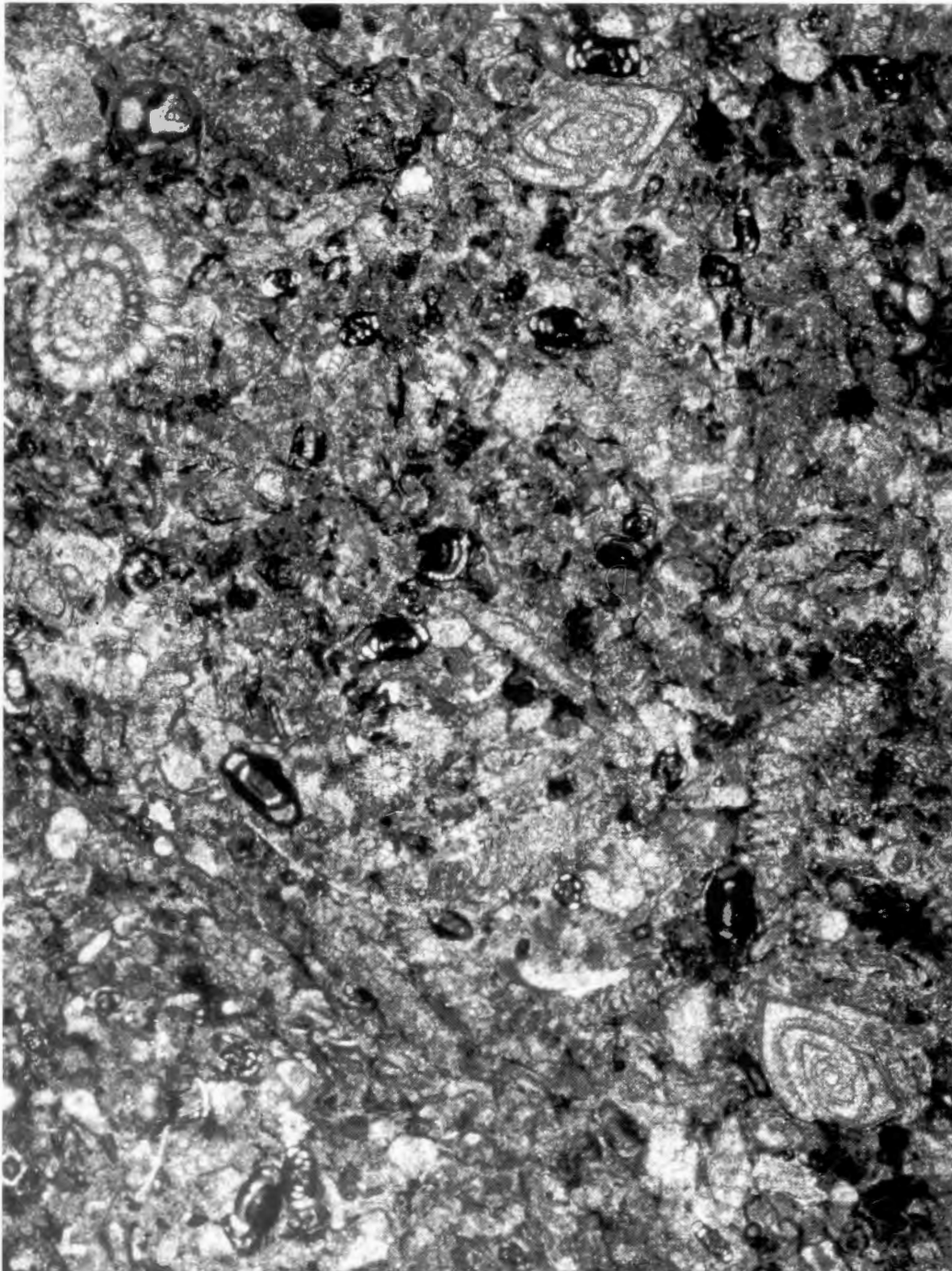
CAMBRIAN			ORDOVICIAN			SILURIAN			DEVONIAN			CARBONIFEROUS			PERMIAN		
E	M	L	E		L	E		L	E	M	L	E		L	E		L

Opposite page
Yabeina syrtalis (DOUVILLÉ).
Mizzia velebitana SCHUBERT and
Permocalculus are also present (X 10).
UPPER PERMIAN of Jebel Tebaga,
Tunisia.

CAMBRIAN			ORDOVICIAN			SILURIAN			DEVONIAN			CARBONIFEROUS			PERMIAN		
E	M	L	E		L	E		L	E	M	L	E		L	E		L

The structure of the *Neoschwagerinidae* to which *Yabeina* belongs is typical of the LATE PERMIAN Fusulinids.

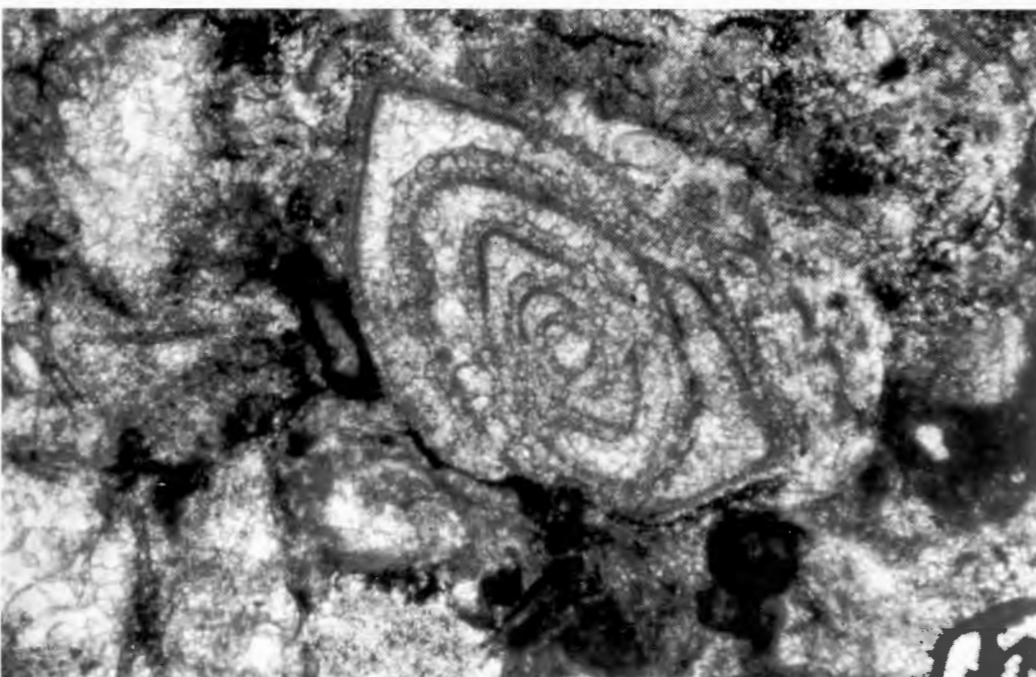




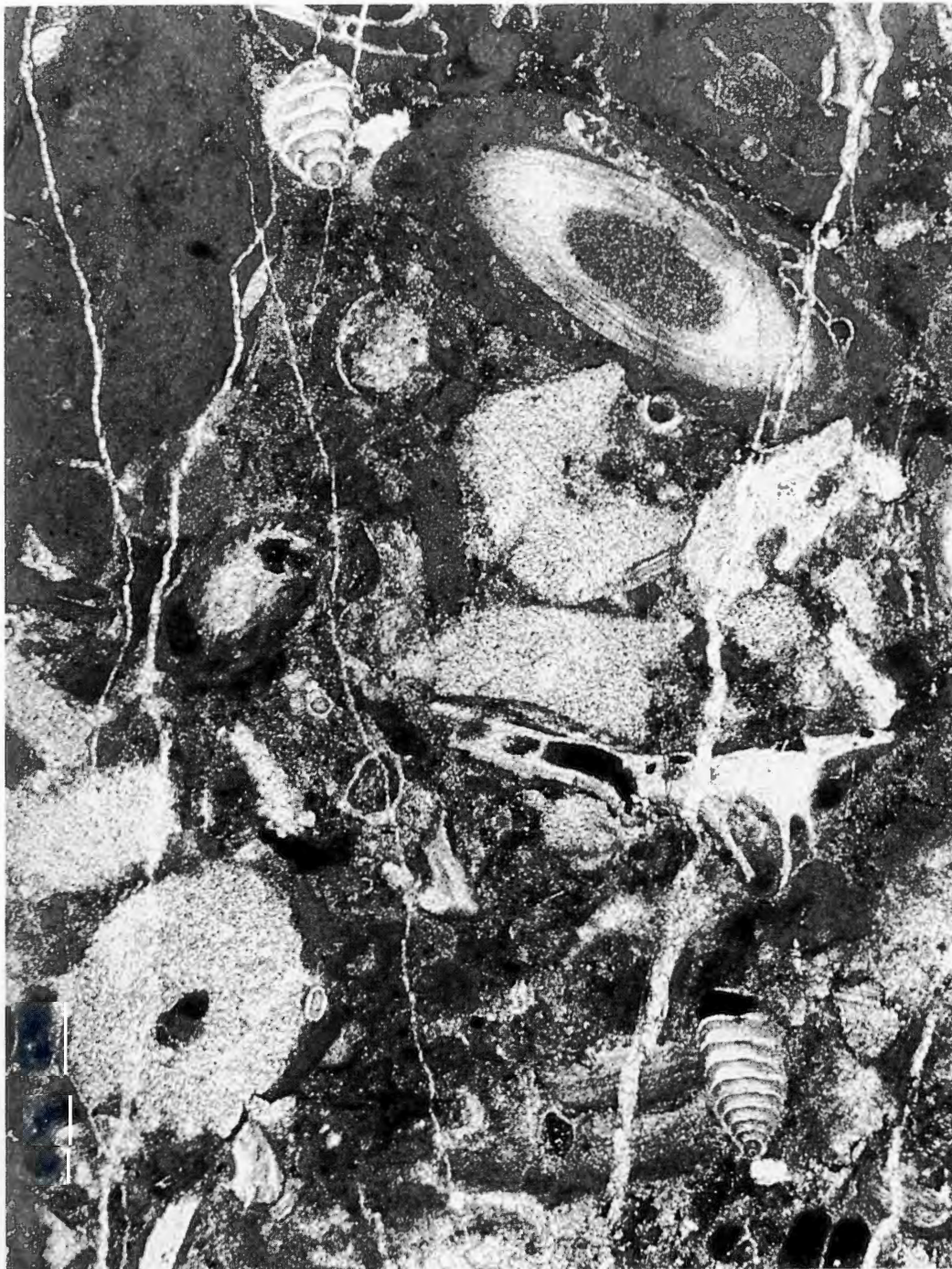
Sichotenella. *Hemigordius* is present (X 25).
UPPER PERMIAN of Agordino, Venetia, Italy.

CAMBRIAN			ORDOVICIAN			SILURIAN			DEVONIAN			CARBONIFEROUS			PERMIAN		
E	M	L	E	L		E	L		E	M	L	E	L		E	L	

One of the last Fusulinids. *Sichotenella* shows primitive features.



Sichotenella (X 95).
UPPER PERMIAN of Agordino, Venetia, Italy.



Geinitzina. Crinoids, brachiopods, and bryozoans are present (X 45). Detail (X 90).
UPPER CARBONIFEROUS of Monte Auernig, Friuli, Italy.

CAMBRIAN			ORDOVICIAN		SILURIAN		DEVONIAN			CARBONIFEROUS		PERMIAN	
E	M	L	E	L	E	L	E	M	L	E	L	E	L



Pachyphloia (X 80) (left).
LOWER PERMIAN of Amanda 1 bis well, Adriatic Sea.

Pachyphloia (X 80) (right).
UPPER PERMIAN of Kuh-e-Dinar, Zagros, Iran.

CAMBRIAN			ORDOVICIAN		SILURIAN		DEVONIAN			CARBONIFEROUS		PERMIAN	
E	M	L	E	L	E	L	E	M	L	E	L	E	L





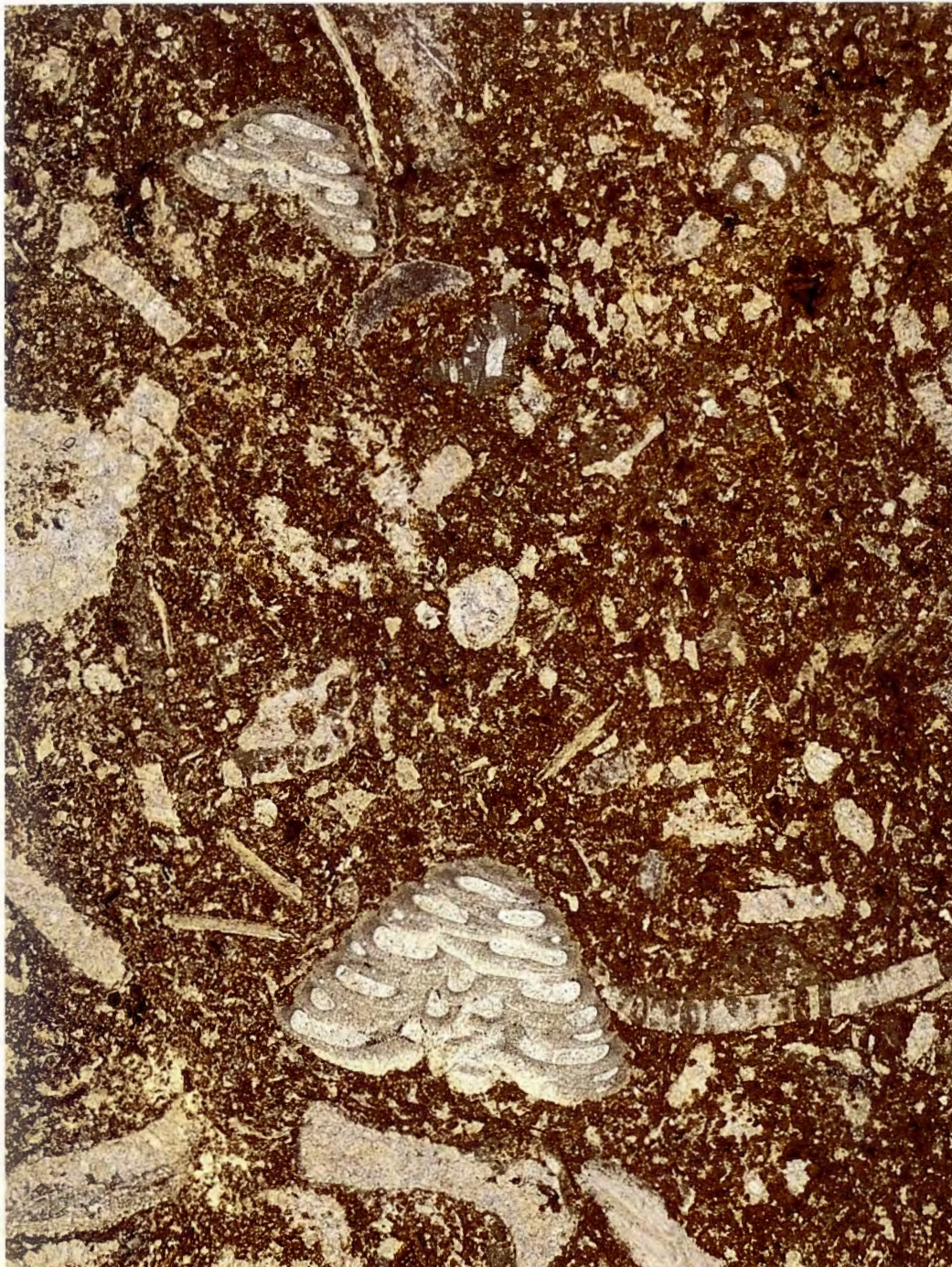
Climacammina. *Schwagerinidae*, benthonic foraminifers, echinoids and algae are present (X 20).
UPPER CARBONIFEROUS of Monte Auernig, Friuli, Italy.

CAMBRIAN			ORDOVICIAN		SILURIAN		DEVONIAN			CARBONIFEROUS		PERMIAN	
E	M	L	E	L	E	L	E	M	L	E	L	E	L



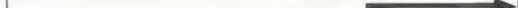
Cribrogenerina. *Epimastopora* is also present (X 20).
UPPER PERMIAN of Jebel Tebaga, Tunisia.

CAMBRIAN			ORDOVICIAN		SILURIAN		DEVONIAN			CARBONIFEROUS		PERMIAN	
E	M	L	E	L	E	L	E	M	L	E	L	E	L



COLL.: BALDUZZI

Tetrataxis, *Epimastopora* and bryozoans are present (X 15).
UPPER PERMIAN of Jebel Tebaga, Tunisia.

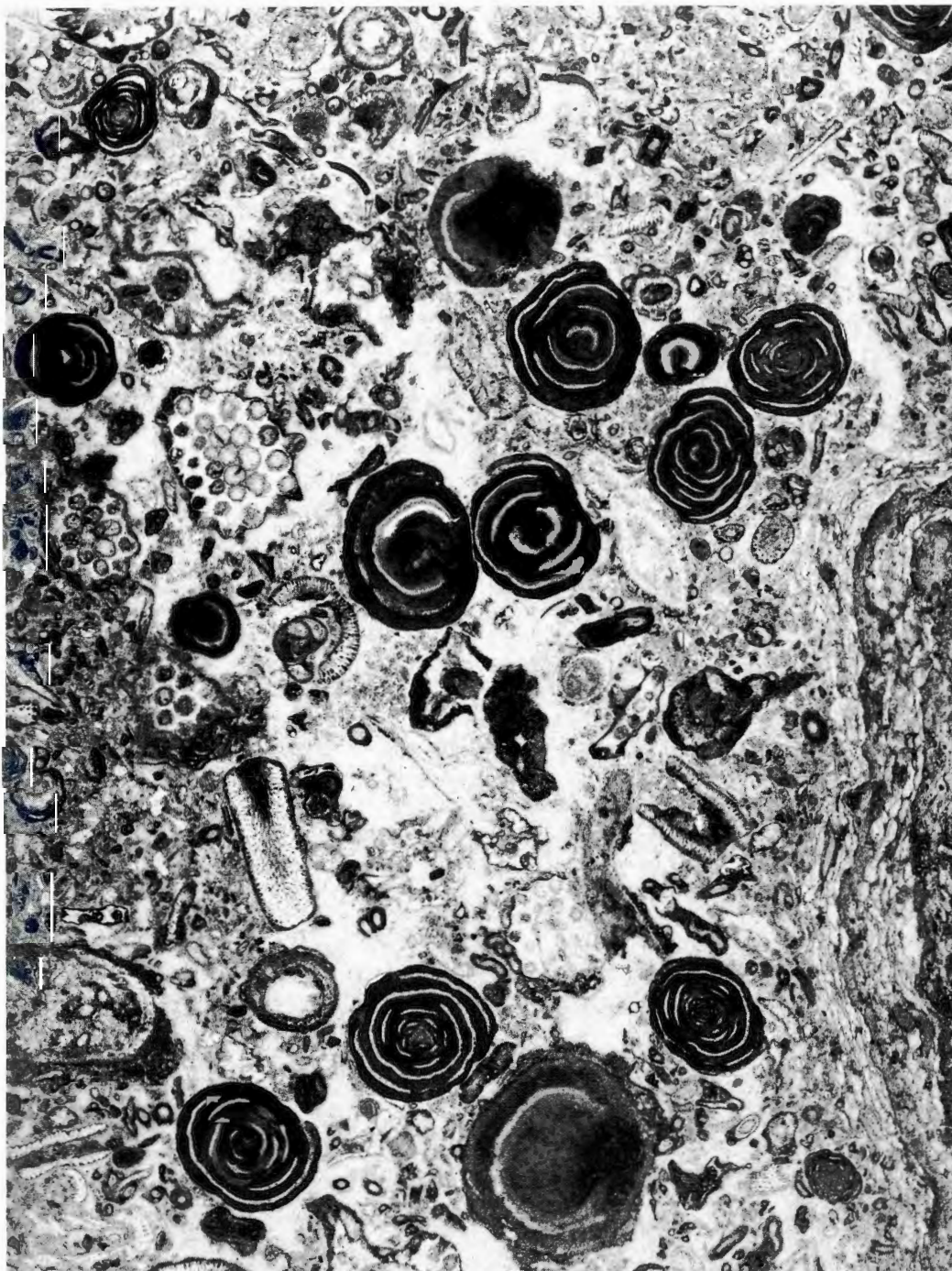
CAMBRIAN			ORDOVICIAN		SILURIAN		DEVONIAN			CARBONIFEROUS		PERMIAN	
E	M	L	E	L	E	L	E	M	L	E	L	E	L
													



COLL.: BALDUZZI

Tetrataxis (X 25).
UPPER PERMIAN of Jebel Tebaga, Tunisia.



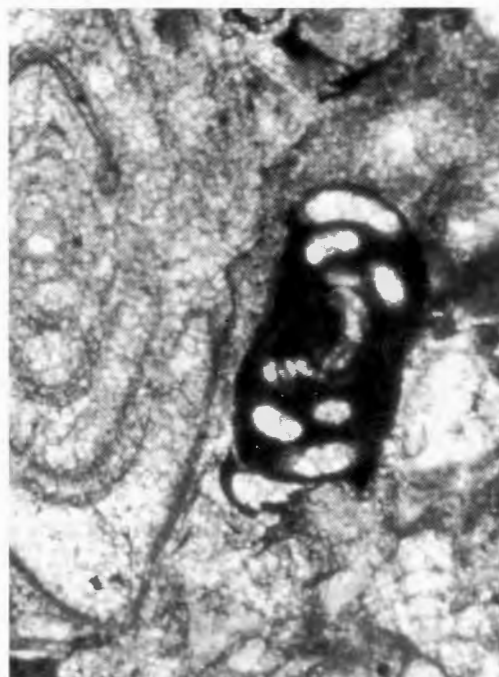


COLL.: BALDUZZI

Opposite page
Schwagerinidae, *Yabeina sirtalis* (DOUVILLÉ),
Dunbarula mathieui CIRY, *Hemigordiopsis*,
Cribrogenerina, *Mizzia* and gastropods
 (X 15).
 UPPER PERMIAN of Jebel Tebaga,
 Tunisia.

Hemigordiopsis, *Mizzia*, *Permocalculus*
 and encrusting algae are present (X 7).
 UPPER PERMIAN of Jebel Tebaga,
 Tunisia.

CAMBRIAN			ORDOVICIAN		SILURIAN		DEVONIAN			CARBONIFEROUS			PERMIAN	
E	M	L	E	L	E	L	E	M	L	E	L	E	L	



Hemigordius (X 95) (left).
 UPPER PERMIAN of Agordino, Venetia,
 Italy.

Hemigordius (X 95) (right).
 UPPER PERMIAN of Agordino, Venetia,
 Italy.

CAMBRIAN			ORDOVICIAN		SILURIAN		DEVONIAN			CARBONIFEROUS		PERMIAN	
E	M	L	E	L	E	L	E	M	L	E	L	E	L



Anthracoporella spectabilis PIA
(X 7).
UPPER CARBONIFEROUS of Monte
Pizzul, Friuli, Italy.

CAMBRIAN			ORDOVICIAN			SILURIAN			DEVONIAN			CARBONIFEROUS			PERMIAN		
E	M	L	E	L		E	L		E	M	L	E	L		E	L	



Archaeolithophyllum (X 15).
UPPER CARBONIFEROUS of Monte
Auernig, Friuli, Italy.

CAMBRIAN			ORDOVICIAN			SILURIAN			DEVONIAN			CARBONIFEROUS			PERMIAN		
E	M	L	E	L		E	L		E	M	L	E	L		E	L	



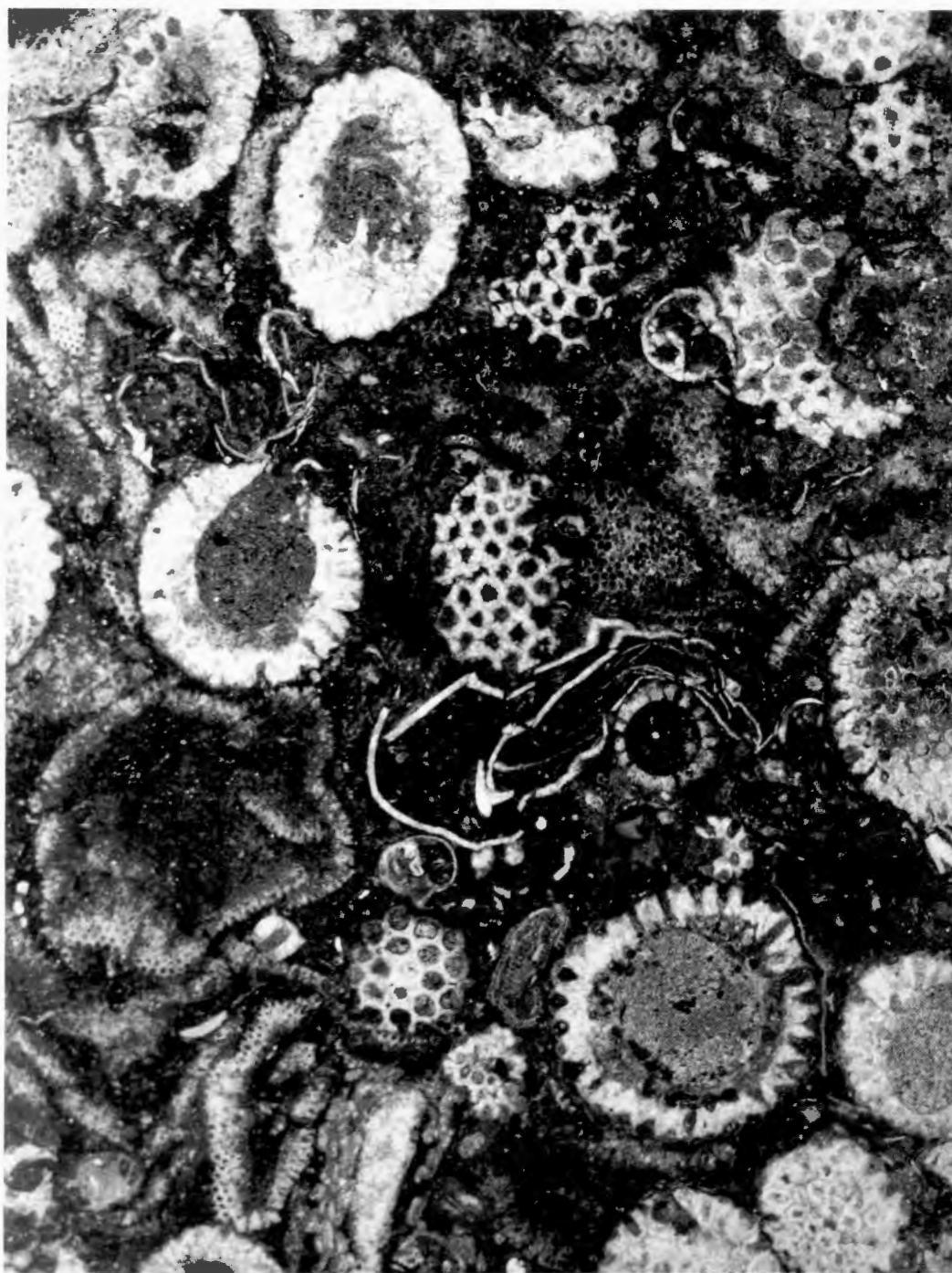
Tubiphytes (X 8).
LOWER PERMIAN of Amanda 1 bis well,
Adriatic Sea.

Tubiphytes is an important PERMIAN reef-building alga. Also in the TRIASSIC some reefs are dominated by *Tubiphytes*.



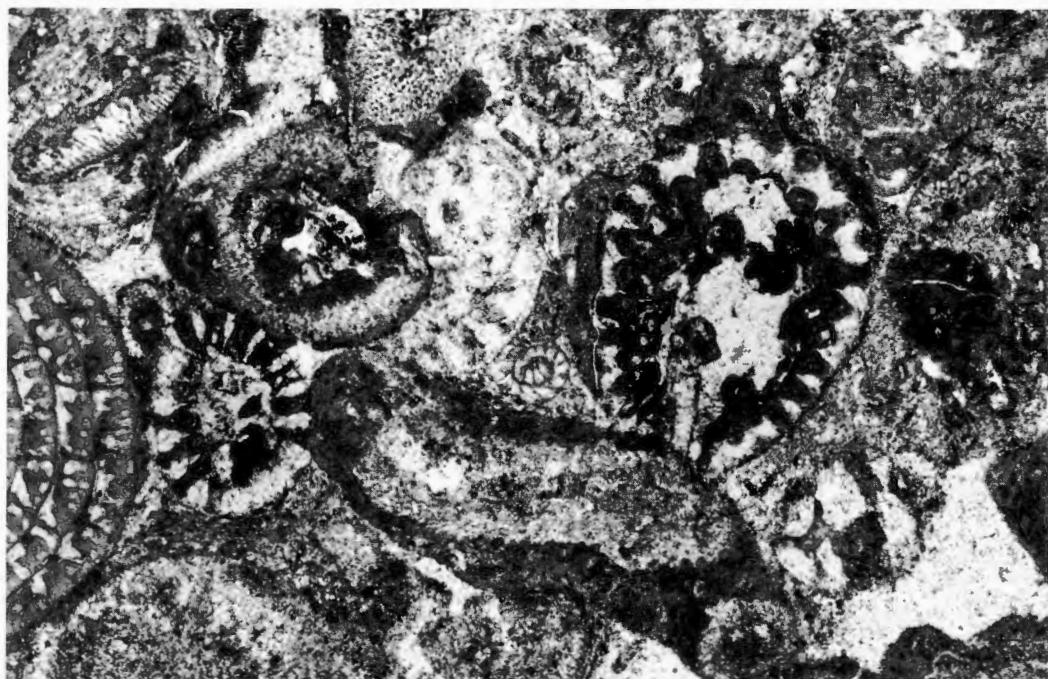
Epimastopora. Schwagerinidae are also present (X 15).
LOWER PERMIAN of Col di Mezzodi,
Friuli, Italy.

CAMBRIAN			ORDOVICIAN		SILURIAN		DEVONIAN			CARBONIFEROUS			PERMIAN	
E	M	L	E	L	E	L	E	M	L	E	L	E	L	



Mizzia velebitana SCHUBERT. *Gymnocodium* and *Permocalculus* are present (X 12).
UPPER PERMIAN of Velebit, Yugoslavia.

CAMBRIAN			ORDOVICIAN			SILURIAN			DEVONIAN			CARBONIFEROUS			PERMIAN		
E	M	L	E	L		E	L		E	M	L	E	L		E	L	



Mizzia velebitana SCHUBERT and *Permocalculus* (X 20).
UPPER PERMIAN of Jebel Tebaga, Tunisia.

COLL. BALDUZZI



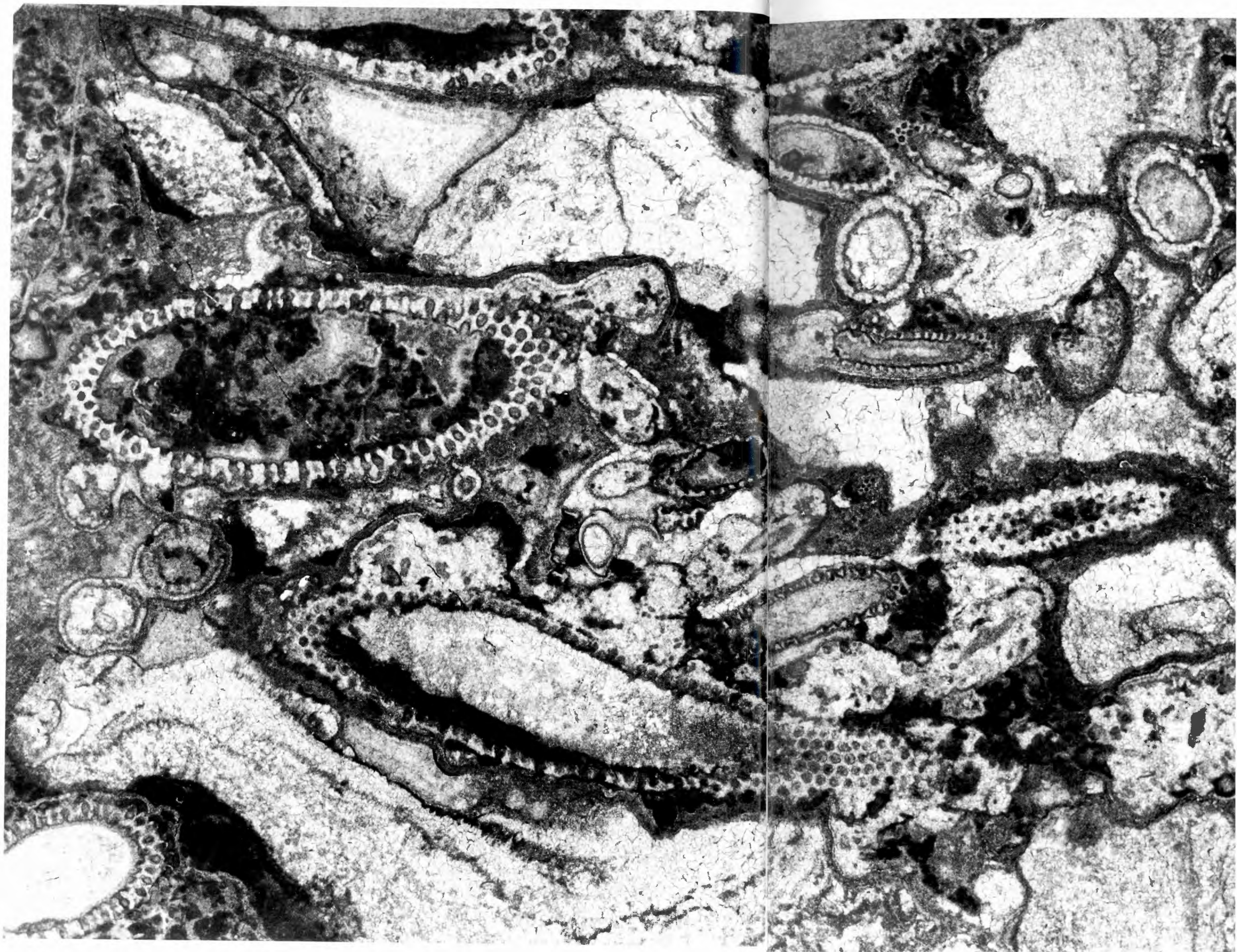
Atractyliopsis lastensis ACCORDI (X 10).
UPPER PERMIAN of Digionera, Venetia, Italy.

CAMBRIAN			ORDOVICIAN			SILURIAN			DEVONIAN			CARBONIFEROUS			PERMIAN		
E	M	L	E	L		E	L		E	M	L	E	L		E	L	



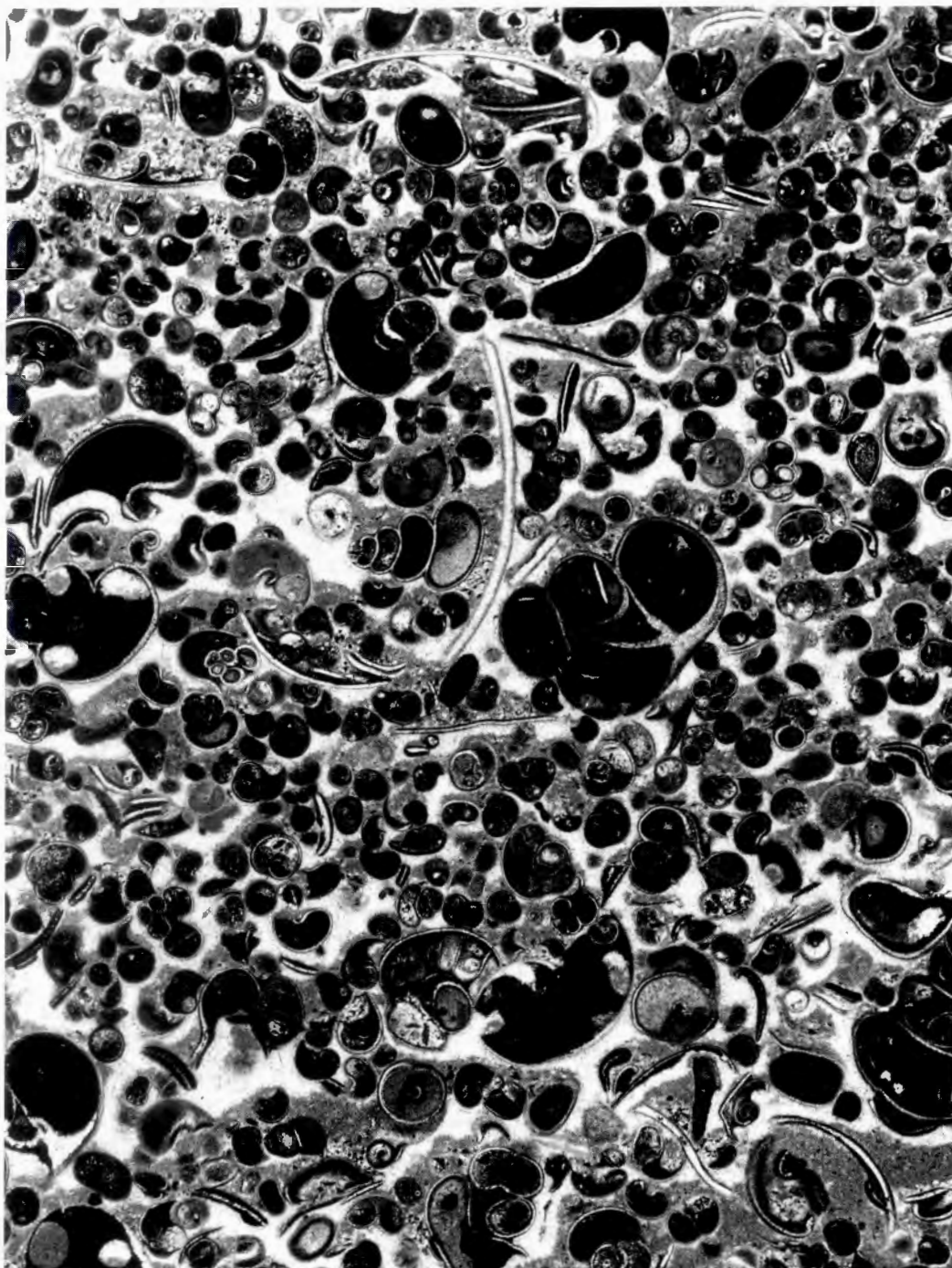
Gymnocodium nodosum OGILVIE-GORDON (X 25).
UPPER PERMIAN of Digionera, Venetia, Italy.

CAMBRIAN			ORDOVICIAN			SILURIAN			DEVONIAN			CARBONIFEROUS			PERMIAN		
E	M	L	E	L		E	L		E	M	L	E	L		E	L	



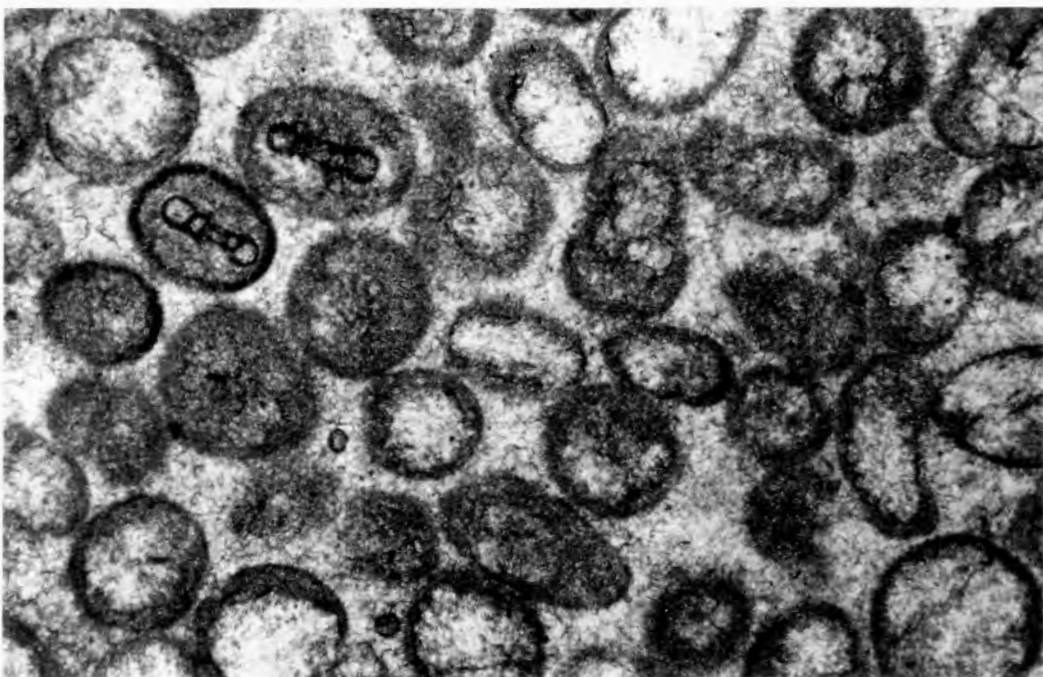
TRIASSIC

EPOCH	AGE	Ma
Agip: (modified from Haq <i>et Al.</i> 1987)		
LATE	RHAETIAN	210
	NORIAN	217
	CARNIAN	225
MIDDLE	LADINIAN	231
	ANISIAN	236
EARLY	SCYTHIAN	240
		250



"Gastropod Oolite". Gastropods, pelecypods and ostracods are the main fossils of this facies (X 10). SCYTHIAN of Termeno, Trentino, Italy.

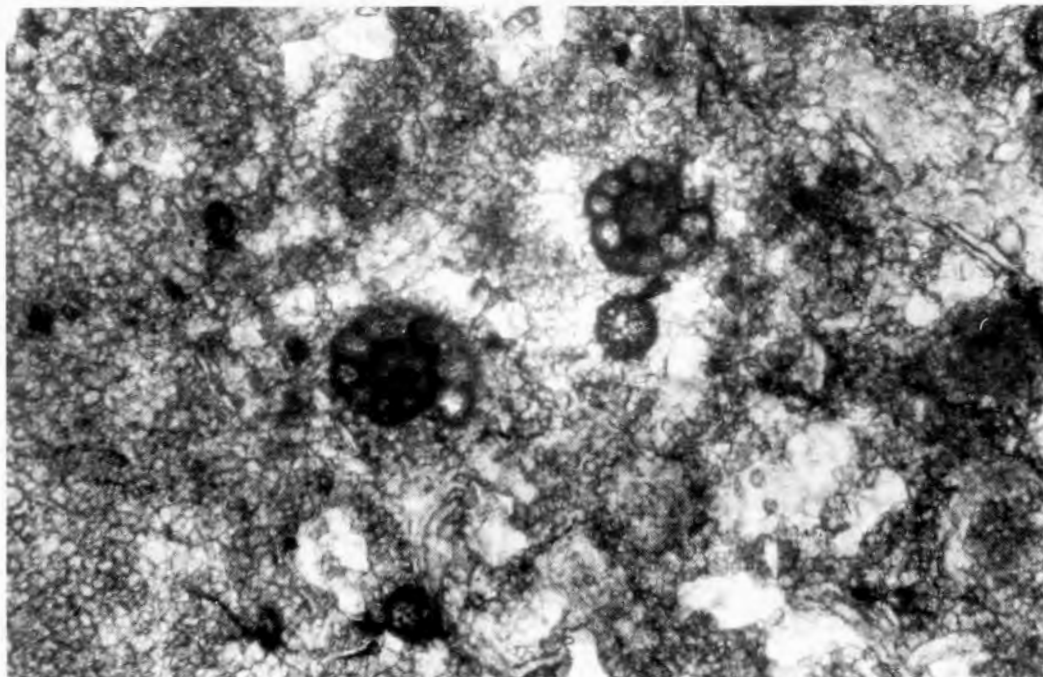
This typical facies stretches from the Mediterranean Area to Iran.



Rectocornuspira kalhori BRÖNNIMANN, ZANINETTI & BOZORGIA (X 210). SCYTHIAN of Passo S. Antonio, Trentino, Italy. Detail from ZANINETTI, 1976 (X 200).

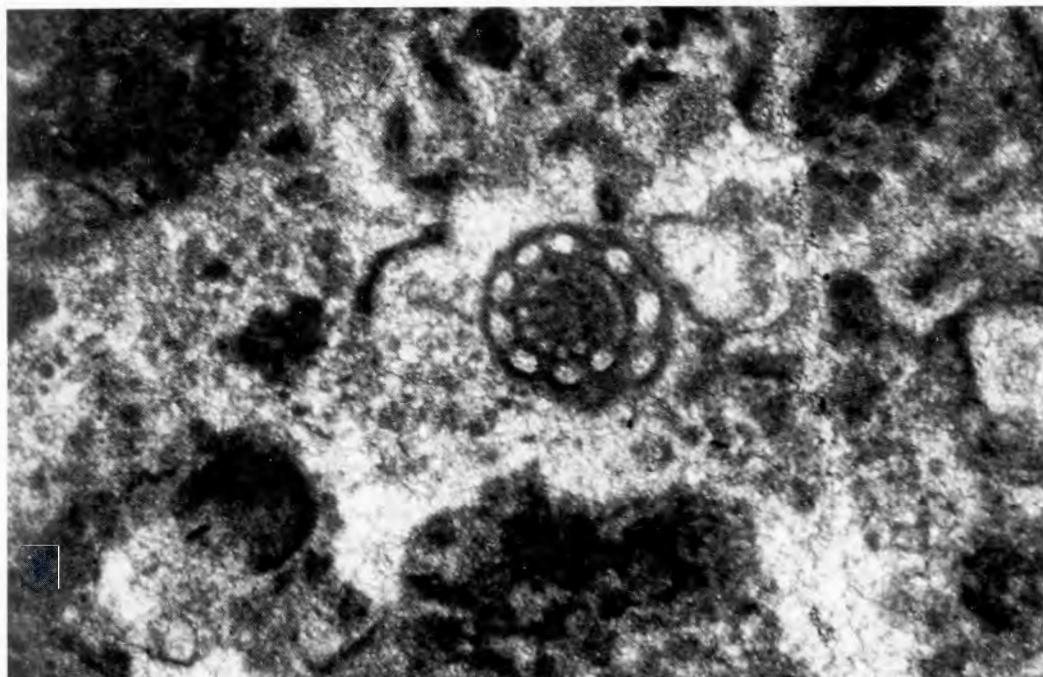
SCYTHIAN	ANSIAN	LADINIAN	CARNIAN	NORIAN	RHAETIAN





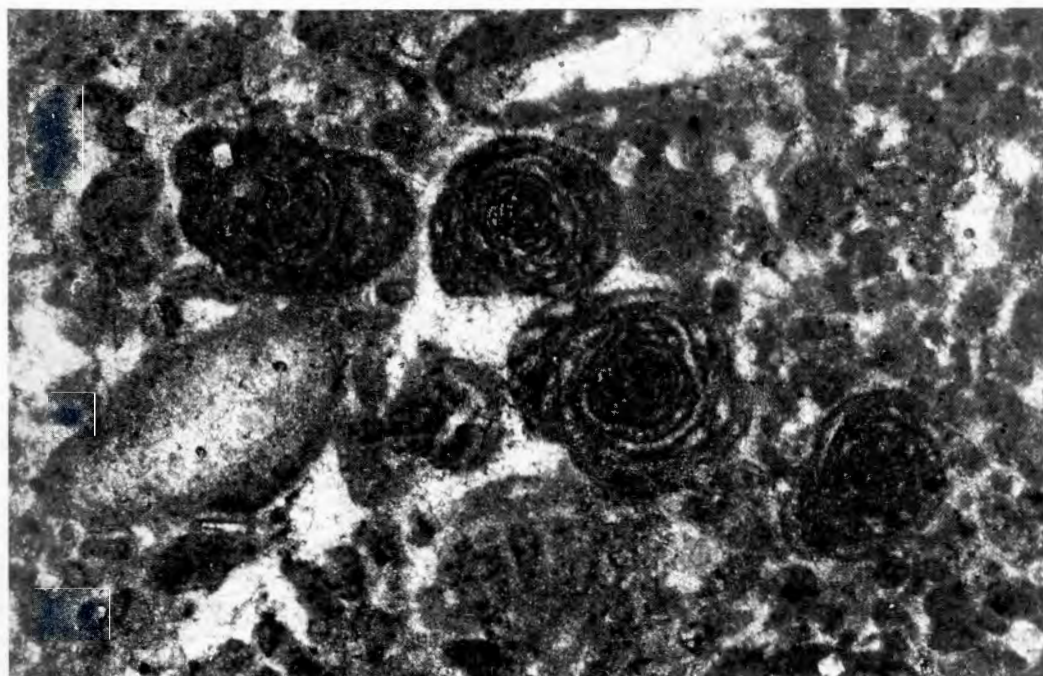
Meandrospira pusilla (HO) (X 360).
SCYTHIAN of Torrente Framont, Trentino,
Italy.

SCYTHIAN	ANISIAN	LADINIAN	CARNIAN	NORIAN	RHAETIAN



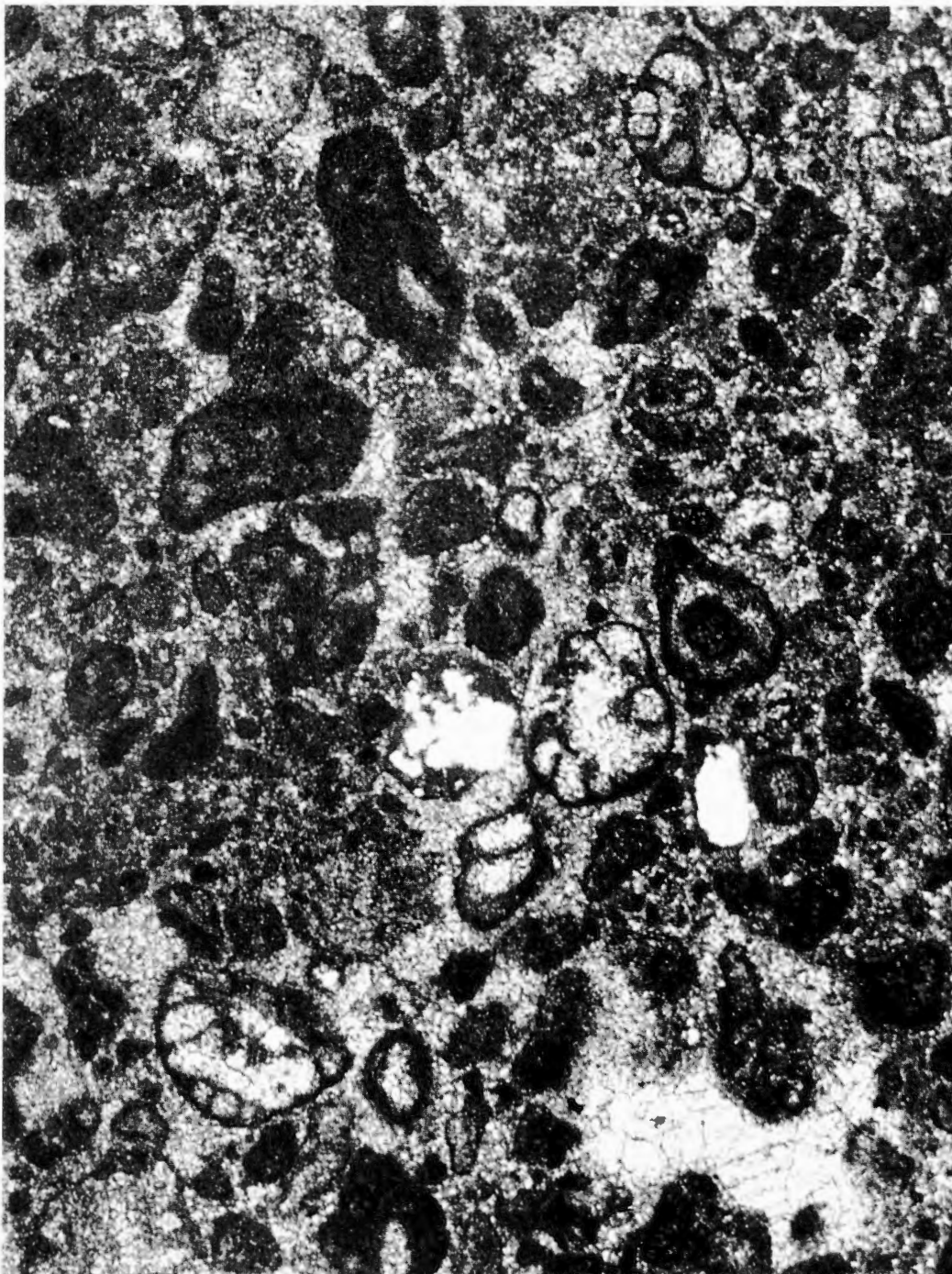
Meandrospira dinarica KOCHANSKY-DEVIDÉ &
PANTIĆ (X 140).
ANISIAN of Malj Halan, Yugoslavia.

SCYTHIAN	ANISIAN	LADINIAN	CARNIAN	NORIAN	RHAETIAN



Pilammna densa PANTIĆ (X 45).
ANISIAN of Stabin Lake, Trentino, Italy.

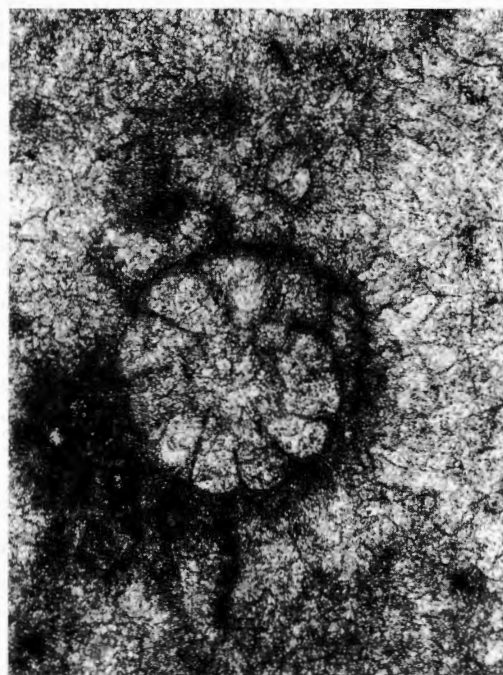
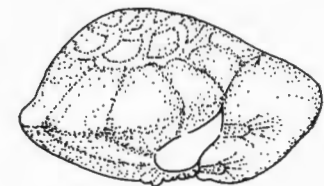
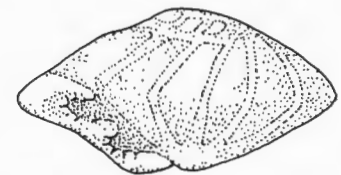
SCYTHIAN	ANISIAN	LADINIAN	CARNIAN	NORIAN	RHAETIAN



Duostominidae (X 45).
CARNIAN of Monte della Grava, Trentino,
Italy.

SCYTHIAN	ANISIAN	LADINIAN	CARNIAN	NORIAN	RHAETIAN

In thin-section the determination of the *Duostominidae*, represented by the genera *Duostomina*, *Diplotremina* and *Variostoma*, is usually difficult. In fact it is necessary to identify features such as the apertures. Details of *Duostomina* (X 100) (above), *Diplotremina* (X 100) (middle) and *Variostoma* (X 100) (below) from KRISTAN-TOLLMAN 1960.



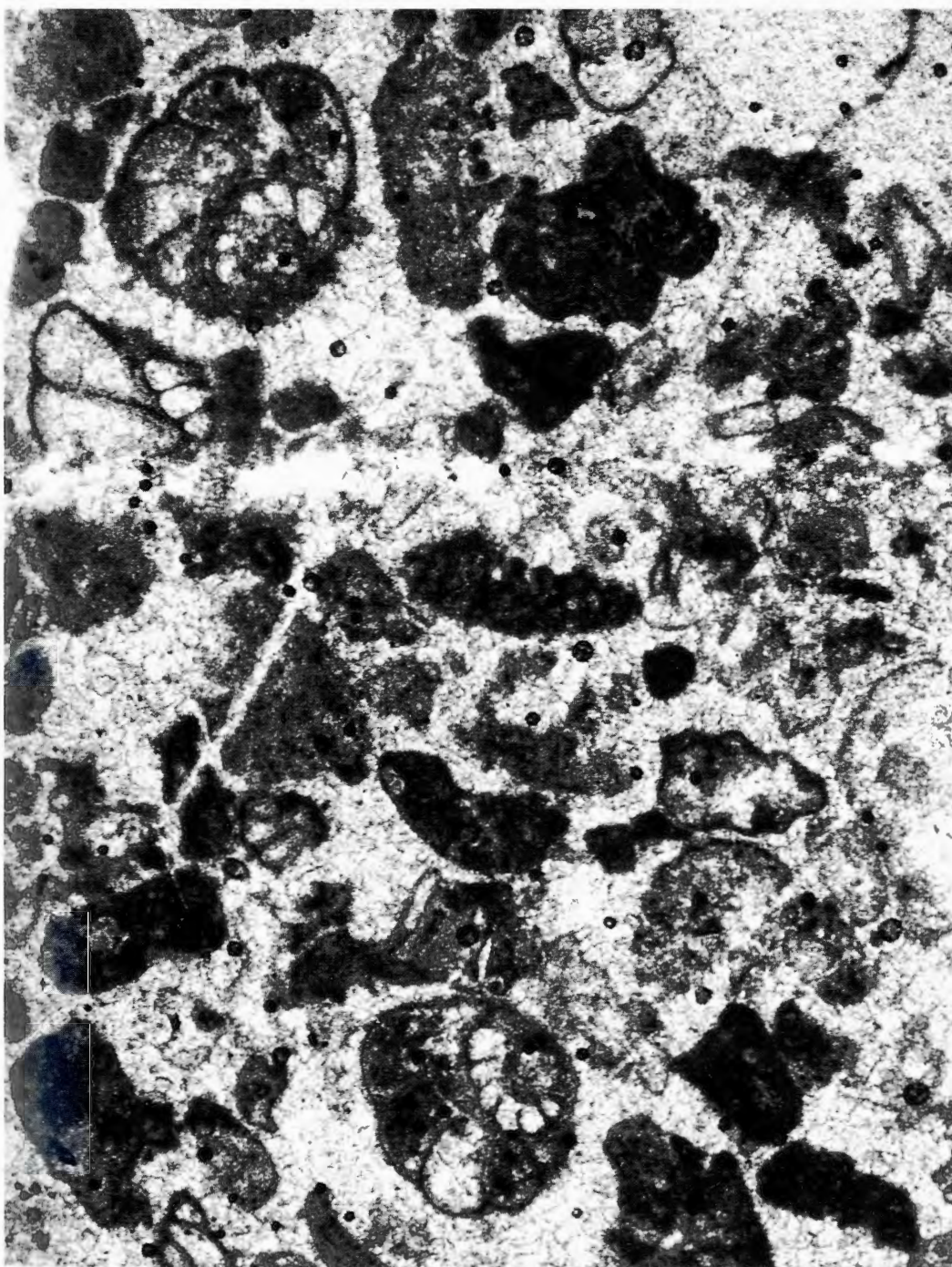
Duostominidae (X 60) (left).
LADINIAN of Amanda 1 bis well, Adriatic
Sea.

Duostominidae (X 65) (right).
LADINIAN of Amanda 1 bis well, Adriatic
Sea.

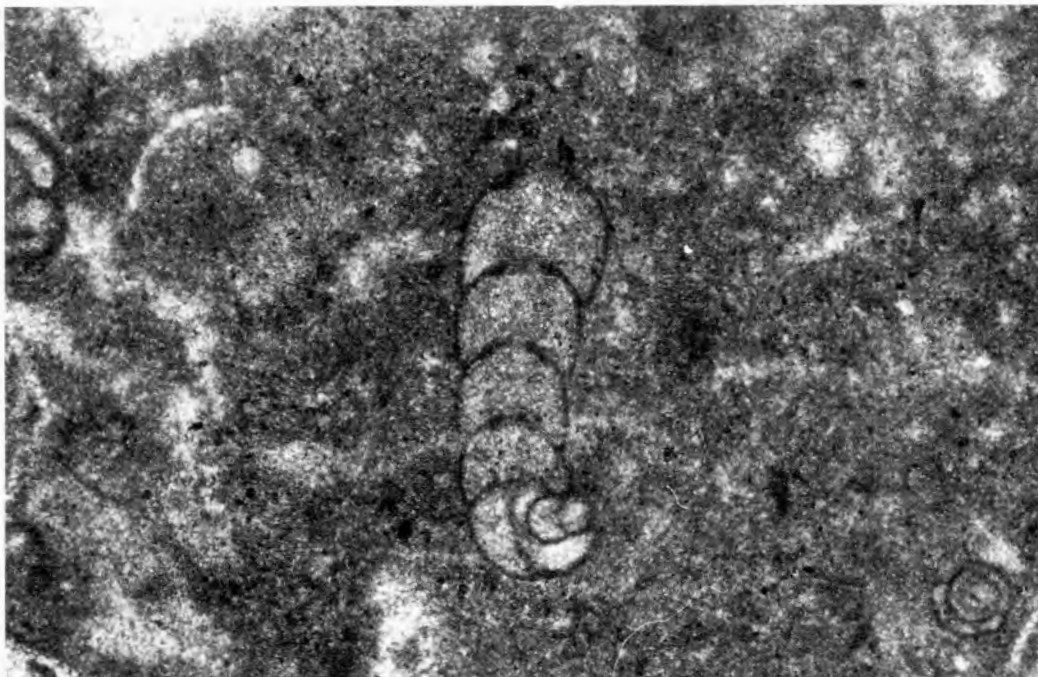


Duostominidae (X 70) (left).
LADINIAN of Amanda 1 bis well, Adriatic
Sea.

Duostominidae (*Variostoma*) (X 45) (right).
LADINIAN of Amanda 1 bis well, Adriatic
Sea.



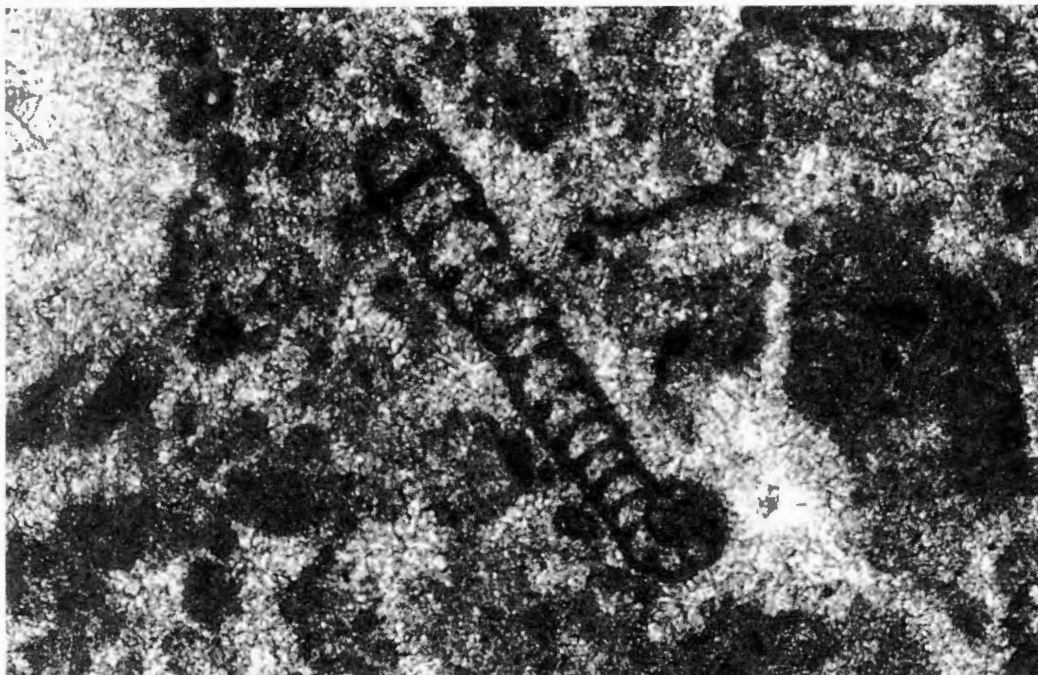
Duostomina (X 50).
RHAETIAN of Hohe Göll Mountain,
Germany.



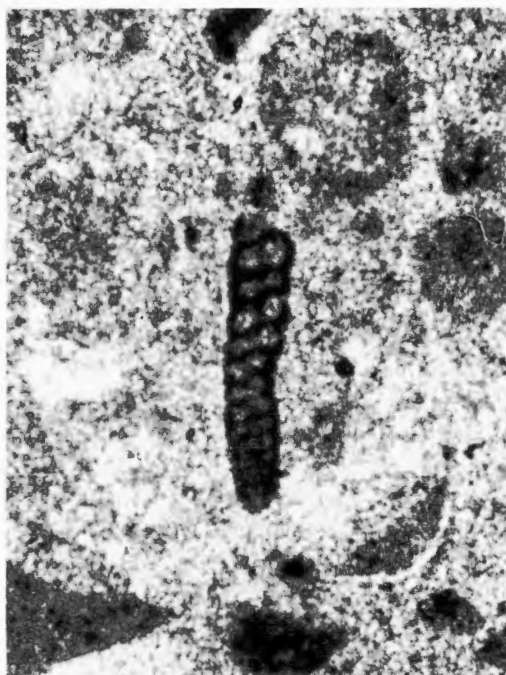
COLL.: EARTH SCIENCES DEP. UNIV. OF MILAN

Endothyranella wirzi (KOEHN-ZANINETTI)
(X 30).
ANISIAN of the Giudicarie Alps, Trentino,
Italy.

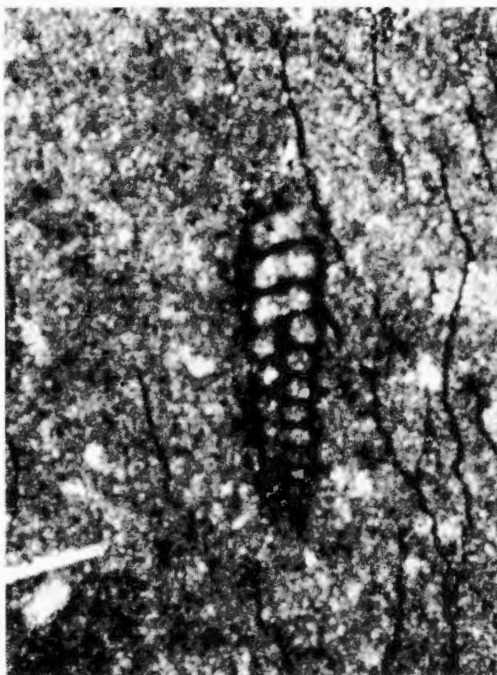
SCYTHIAN	ANISIAN	LADINIAN	CARNIAN	NORIAN	RHAETIAN



Endothyranella (X 40).
LADINIAN of Amanda 1 bis well, Adriatic
Sea.



COLL.: EARTH SCIENCES DEP. UNIV. OF PERUGIA

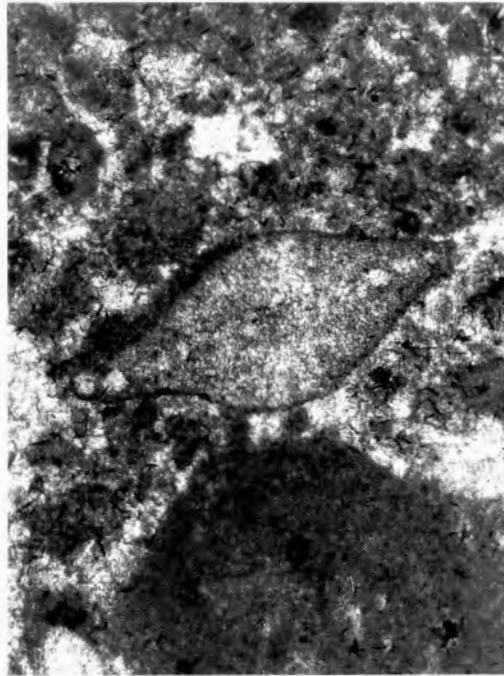


COLL.: EARTH SCIENCES DEP. UNIV. OF PERUGIA

Turriglomina mesotriasica (KOEHN-ZANINETTI)
(X 140) (left).
LADINIAN of Abriola, Basilicata, Italy.

Turriglomina mesotriasica (KOEHN-ZANINETTI)
(X 160) (right).
LADINIAN of Abriola, Basilicata, Italy.

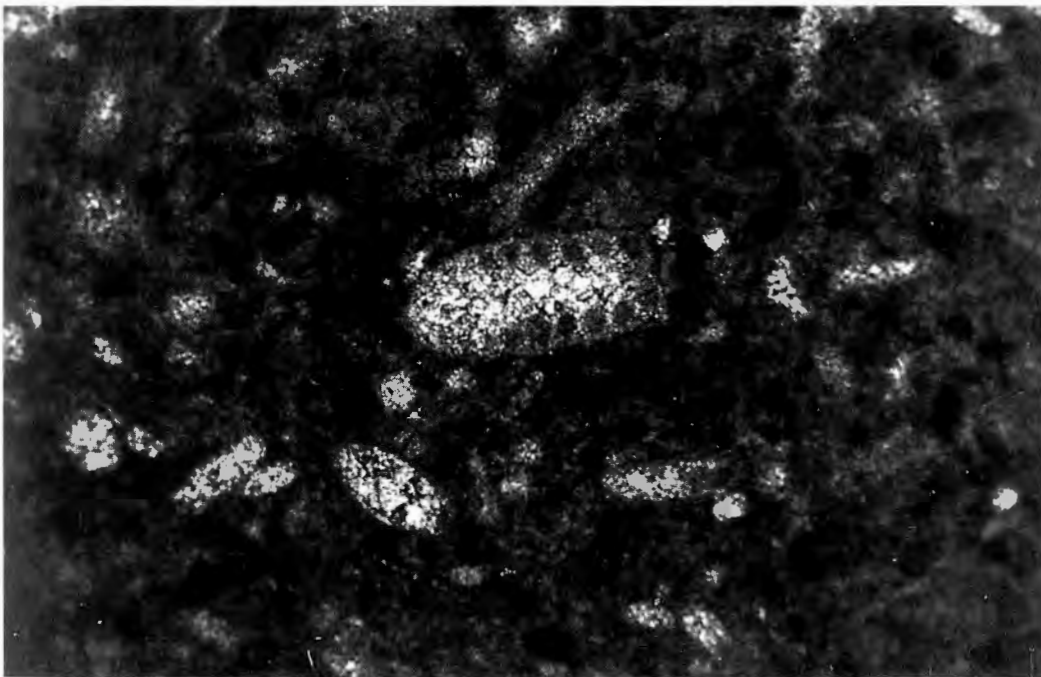
SCYTHIAN	ANISIAN	LADINIAN	CARNIAN	NORIAN	RHAETIAN



Triadodiscus eomesozoicus (OBERHAUSER)
(X 40) (left).
LADINIAN of Villaverla 1 well, Venetia,
Italy.

Triadodiscus eomesozoicus (OBERHAUSER)
(X 40) (right).
LADINIAN of Villaverla 1 well, Venetia,
Italy.

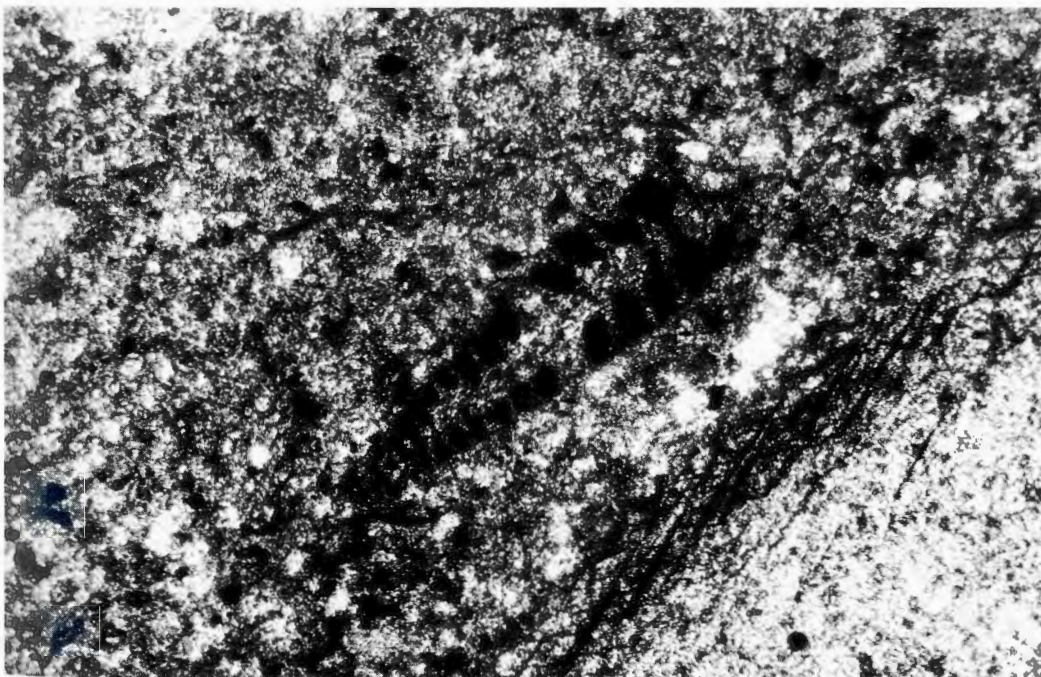
SCYTHIAN	ANISIAN	LADINIAN	CARNIAN	NORIAN	RHAETIAN



Lamelliconus multispinus (OBERHAUSER)
(X 70).
CARNIAN of Pietratagliata, Friuli, Italy.

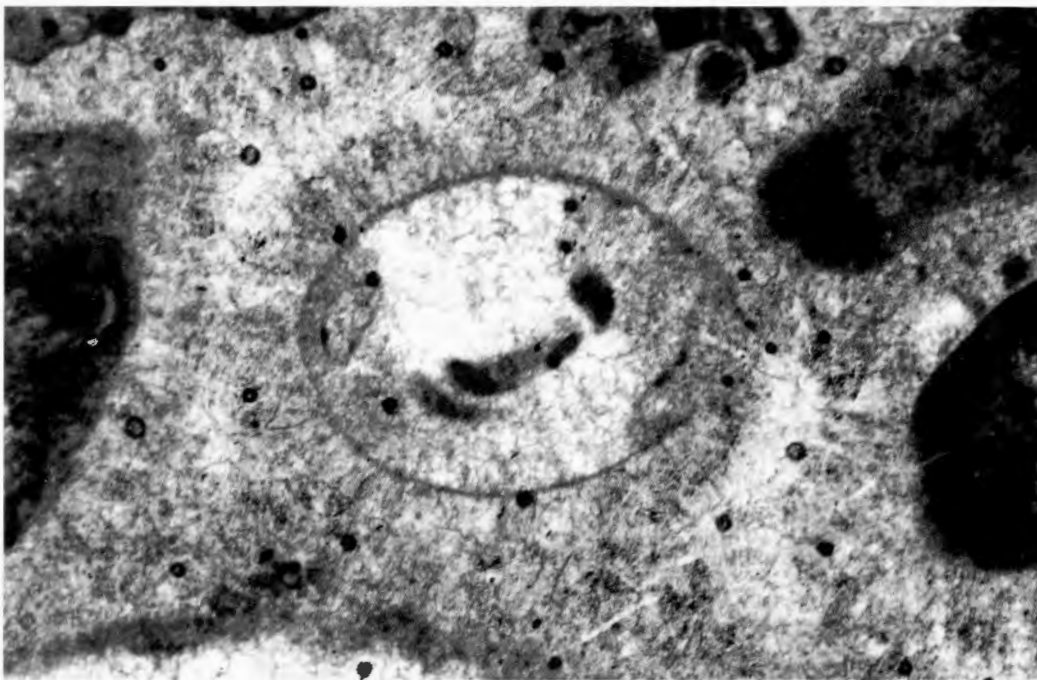
SCYTHIAN	ANISIAN	LADINIAN	CARNIAN	NORIAN	RHAETIAN

The first Trocholina-like forms appear in the
LADINIAN.



Lamelliconus procerus (LIEBUS) (X 120).
CARNIAN of Val Brembana, Lombardy,
Italy.

SCYTHIAN	ANISIAN	LADINIAN	CARNIAN	NORIAN	RHAETIAN

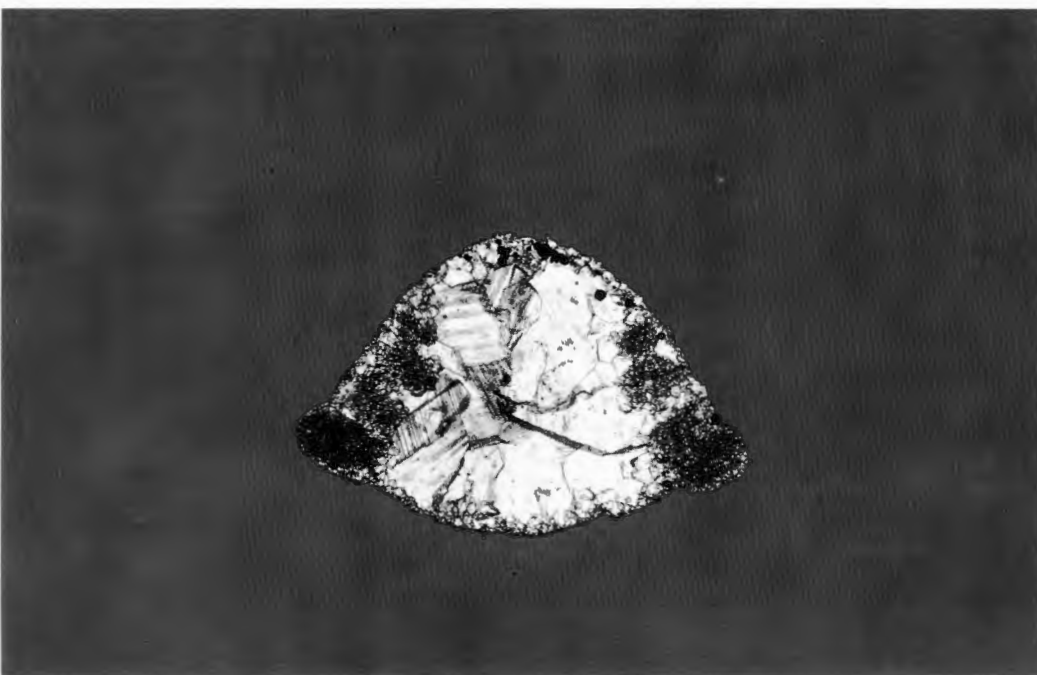


Aulotortus gr. *sinuosus* (WEYNSCHENK)
(X 60).
RHAETIAN of Hohe Göll Mountain,
Germany.

SCYTHIAN	ANISIAN	LADINIAN	CARNIAN	NORIAN	RHAETIAN

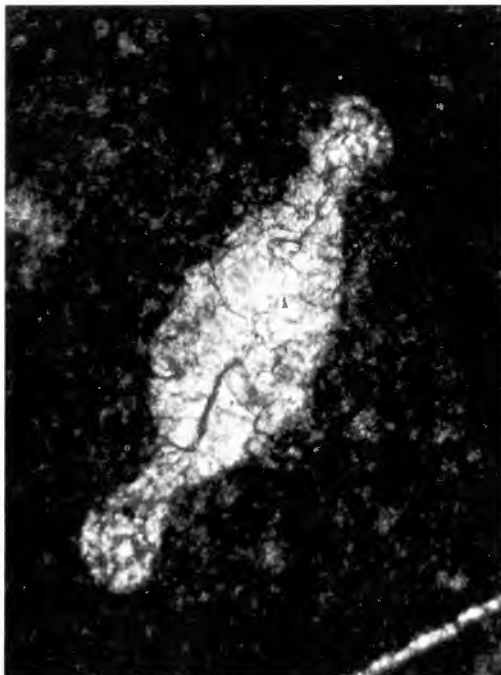


Aulotortus gr. *sinuosus* (WEYNSCHENK)
(X 50).
RHAETIAN of Hohe Göll Mountain,
Germany.



Auloconus *permodiscoides* (OBERHAUSER)
(X 80).
RHAETIAN of Monte di Tremezzo,
Lombardy, Italy.

SCYTHIAN	ANISIAN	LADINIAN	CARNIAN	NORIAN	RHAETIAN



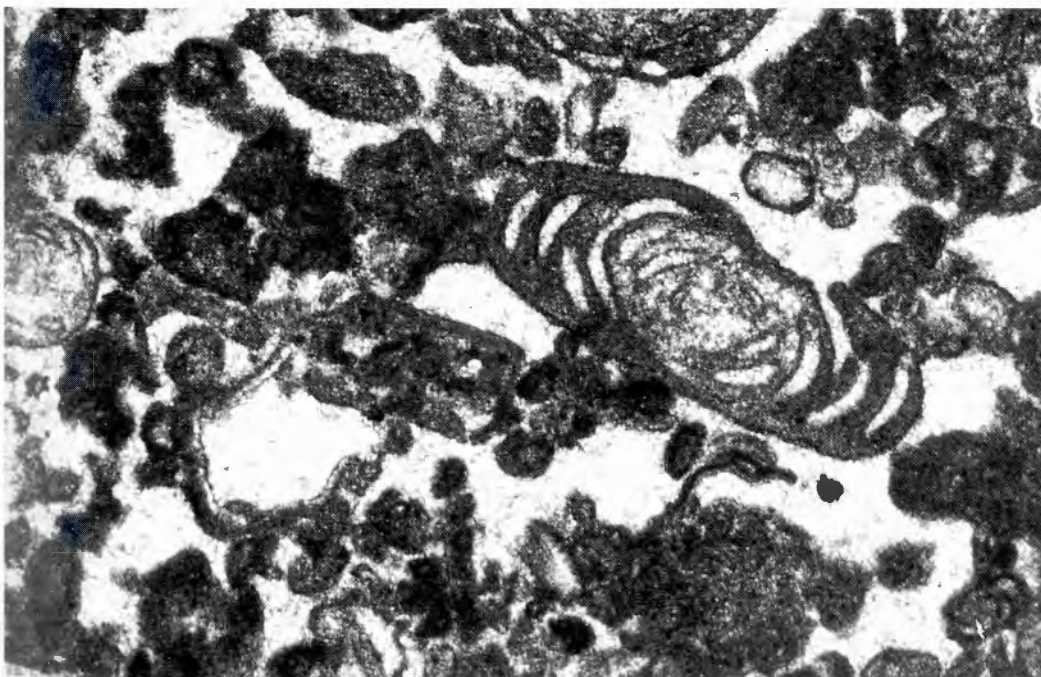
Aulotortus (X 110) (left).
RHAETIAN of Monte di Tremezzo,
Lombardy, Italy.

Aulotortus (X 150) (right).
RHAETIAN of Monte di Tremezzo,
Lombardy, Italy.

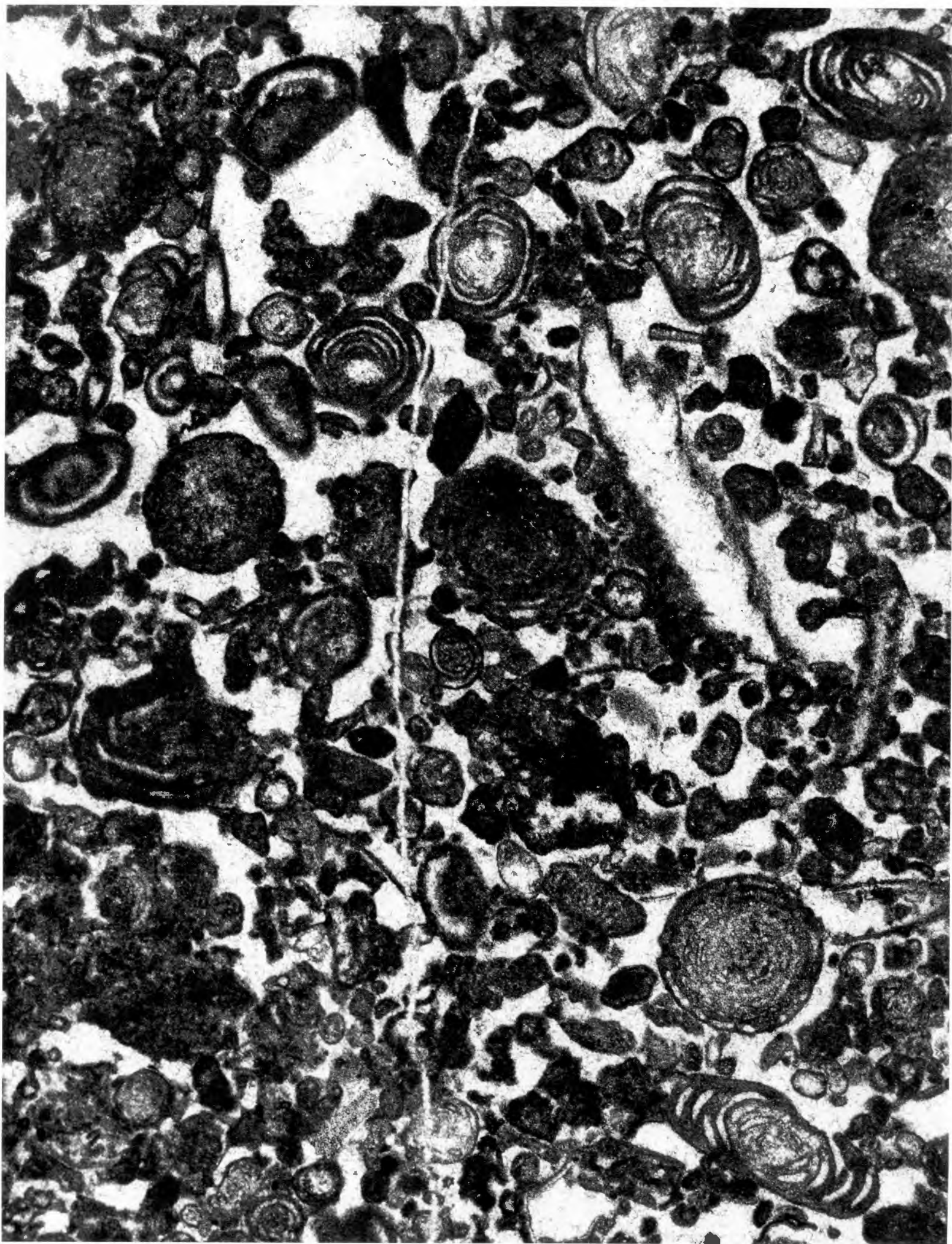


Aulotortus friedly (KRISTAN-TOLMANN) (X 70).
RHAETIAN of Lattari Mountains, Campania,
Italy.

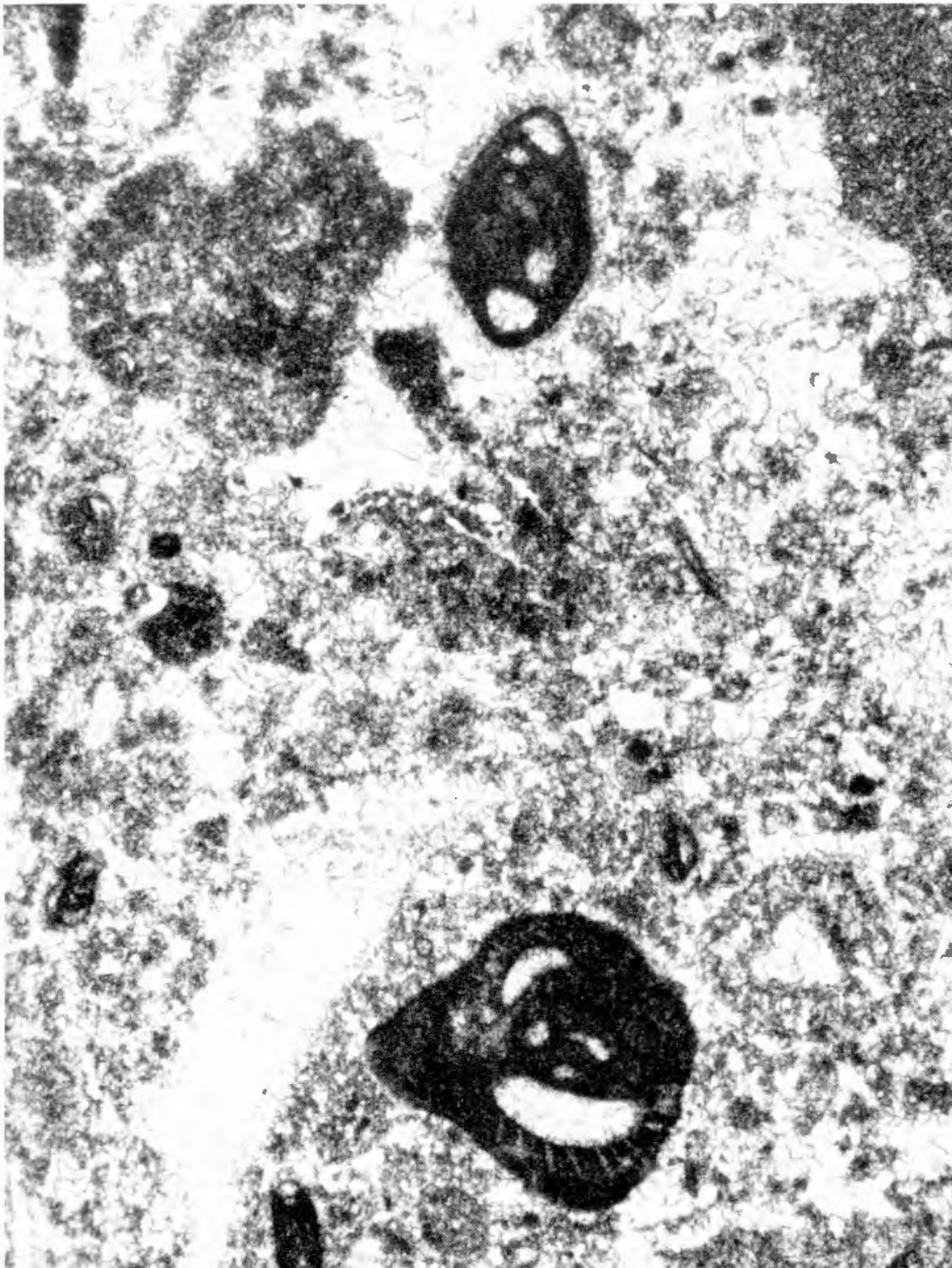
SCYTHIAN	ANISIAN	LADINIAN	CARNIAN	NORIAN	RHAETIAN



Aulotortus friedly (KRISTAN-TOLMANN) (X 60).
RHAETIAN of Acerno, Campania, Italy.



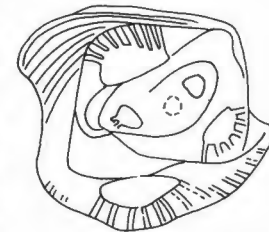
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Opposite page
Aulotortus, *Aulotortus friedly* (KRISTAN-TOLMANN), *Triasina hantkeni* MAJZON, *Glomospirella* (X 50)
 RHAETIAN of Acerno, Campania, Italy.

Galeanella (X 90).
 RHAETIAN of Hohe Göll Mountain, Germany.
 Detail from ZANINETTI 1976 (X 70).

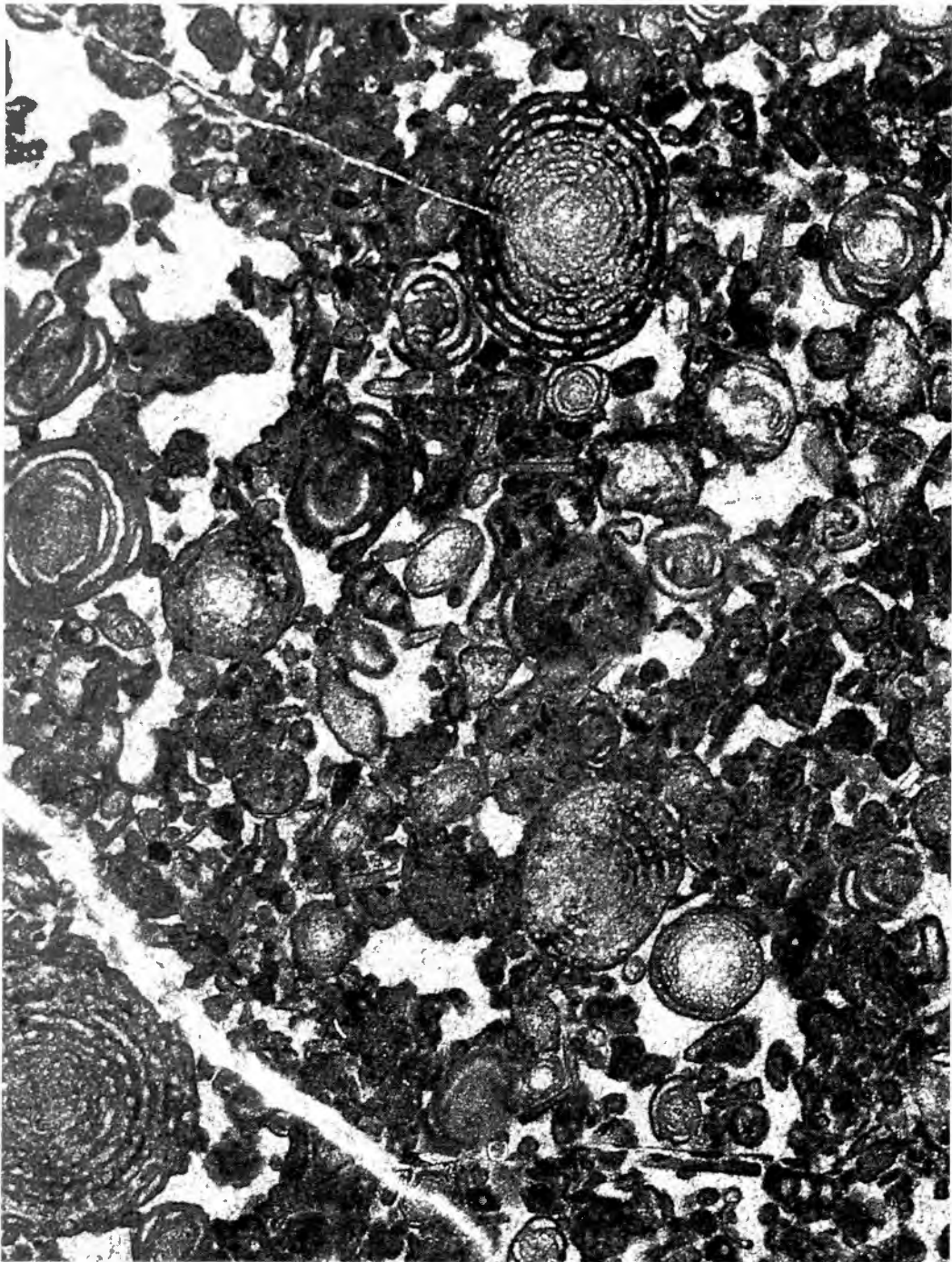
SCYTHIAN	ANISIAN	LADINIAN	CARNIAN	NORIAN	RHAETIAN



Miliolipora cuvillieri BRÖNNIMANN & ZANINETTI (X 90) (left).
 RHAETIAN of Torre dei Busi, Lombardy, Italy.

Miliolipora cuvillieri BRÖNNIMANN & ZANINETTI (X 90) (right).
 RHAETIAN of Torre dei Busi, Lombardy, Italy.

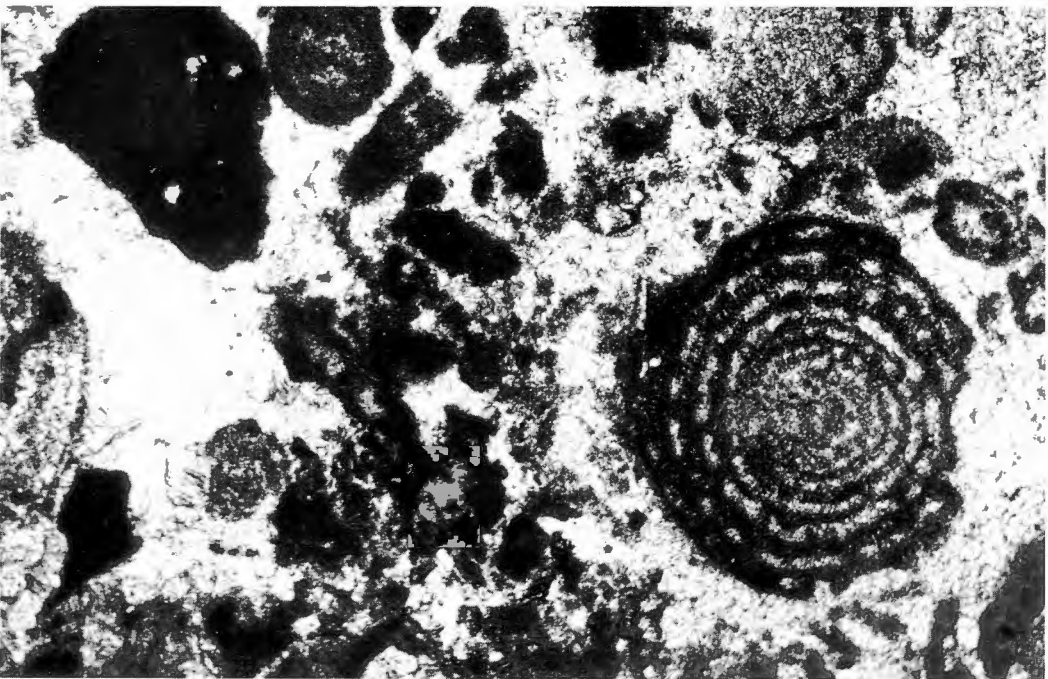
SCYTHIAN	ANISIAN	LADINIAN	CARNIAN	NORIAN	RHAETIAN



COLL.: DE CASTRO, INST. OF PALEONT. UNIV. OF NAPLES

Triasina hantkeni MAJZON. *Aulotortus* and *Glomospirella* are present (X 45).
RHAETIAN of Acerno, Campania, Italy.

SCYTHIAN	ANISIAN	LADINIAN	CARNIAN	NORIAN	RHAETIAN



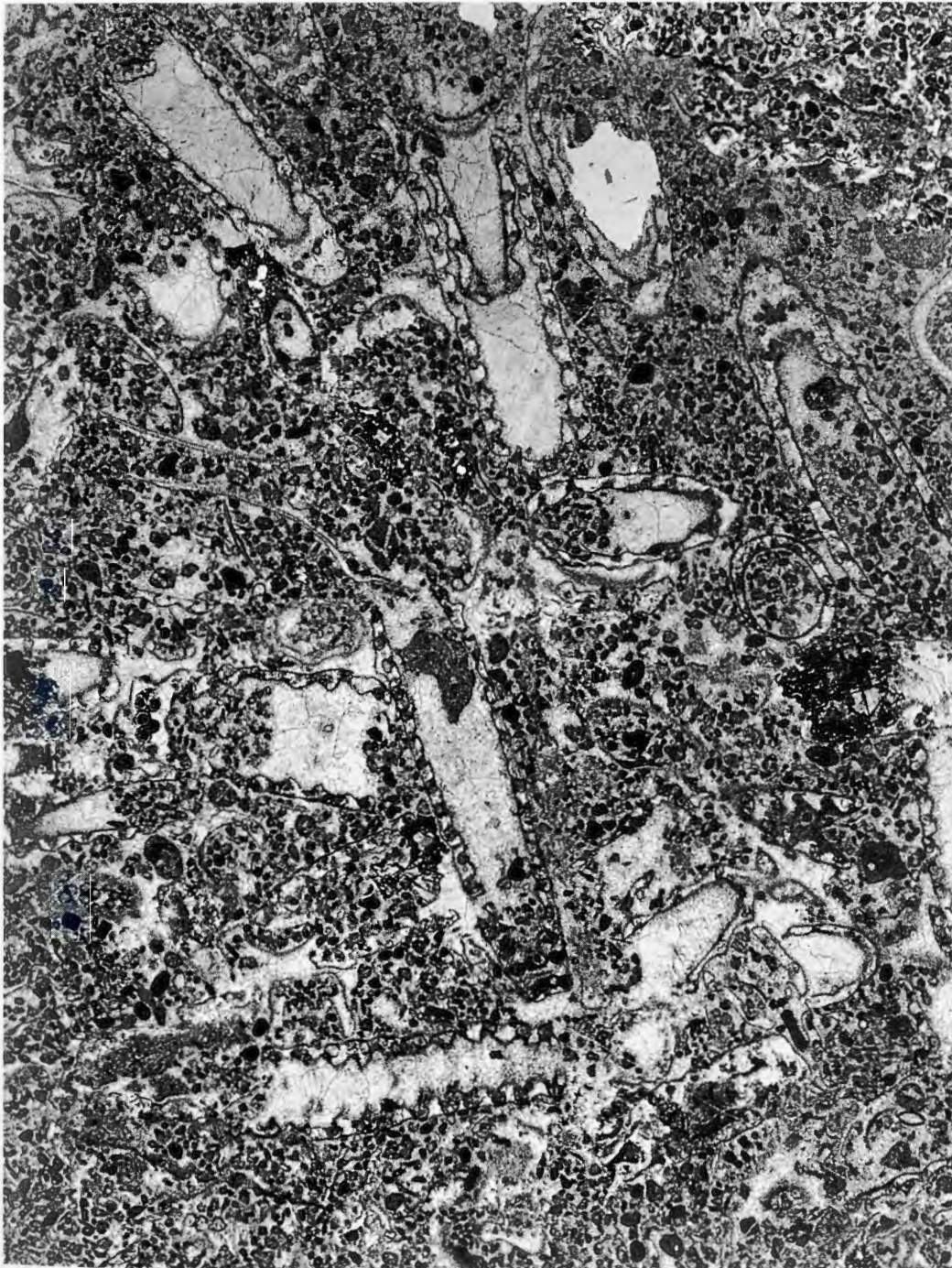
Triasina hantkeni MAJZON (X 60).
RHAETIAN of Monte Lovinzola, Friuli, Italy.



COLL.: EARTH SCIENCES DEP. UNIV. OF MILAN

Oligoporella (X 10).
ANISIAN of Val Gola, Trentino, Italy.

SCYTHIAN	ANISIAN	LADINIAN	CARNIAN	NORIAN	RHAETIAN



COLL.: EARTH SCIENCES DEP. UNIV. OF MILAN

Physoporella associated with *Gyroporella*
(X 10).
ANISIAN of Grigna Meridionale,
Lombardy, Italy.

SCYTHIAN	ANISIAN	LADINIAN	CARNIAN	NORIAN	RHAETIAN



Teutloporella nodosa (SCHAFHÄUTL) (X 9).
LADINIAN of Lagonegro, Basilicata, Italy.

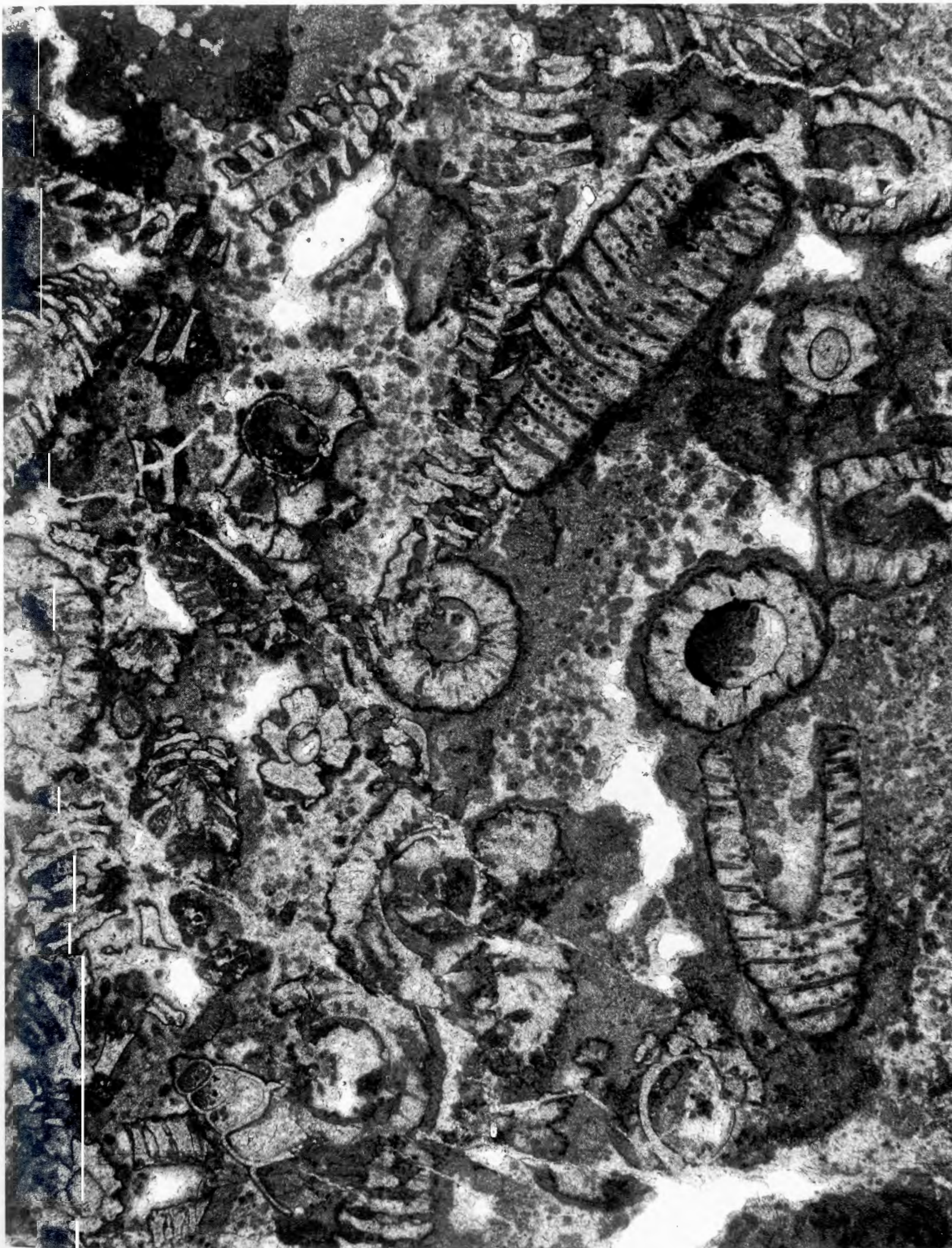
SCYTHIAN	ANISIAN	LADINIAN	CARNIAN	NORIAN	RHAETIAN

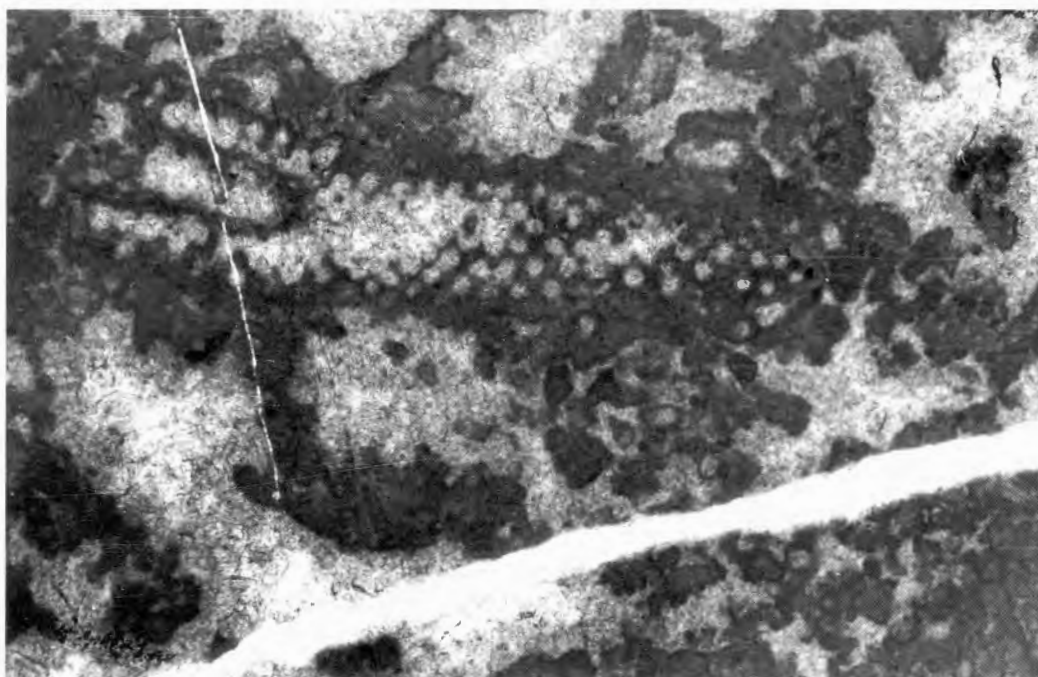


Teutloporella nodosa (SCHAFHÄUTL) (X 10).
LADINIAN of Lagonegro, Basilicata, Italy.

Opposite page
Diplopora annulata SCHAFHÄUTL (X 10).
LADINIAN of Monte Ozol, Trentino, Italy.

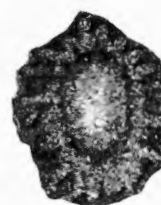
SCYTHIAN	ANISIAN	LADINIAN	CARNIAN	NORIAN	RHAETIAN





Poikiloporella duplicata (PIA) (X 20). Detail (X 20).
CARNIAN of Contursi 1 well, Campania, Italy.

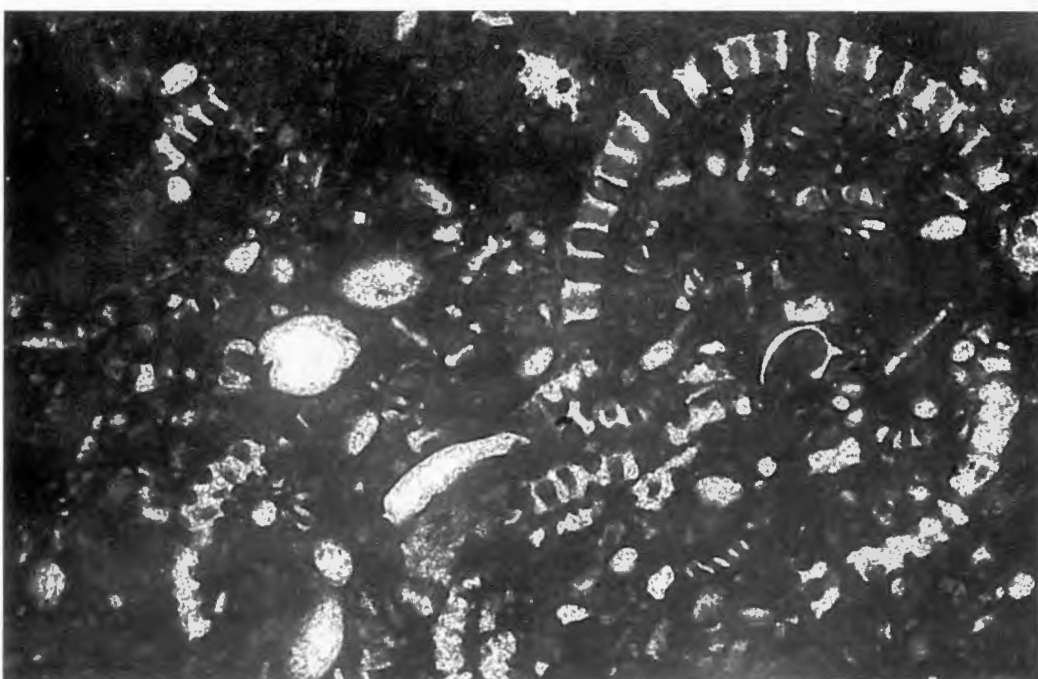
SCYTHIAN	ANISIAN	LADINIAN	CARNIAN	NORIAN	RHAETIAN
			■		



Grifhoporella curvata (GÜMBEL) (X 9).
NORIAN of Erve, Lombardy, Italy.

SCYTHIAN	ANISIAN	LADINIAN	CARNIAN	NORIAN	RHAETIAN
				■	

COLL.: EARTH SCIENCES DEP. UNIV. OF MILAN



Macroporella retica ZANIN-BURI (X 30).
RHAETIAN of Monte Lovinzola, Friuli, Italy.

SCYTHIAN	ANISIAN	LADINIAN	CARNIAN	NORIAN	RHAETIAN
					■

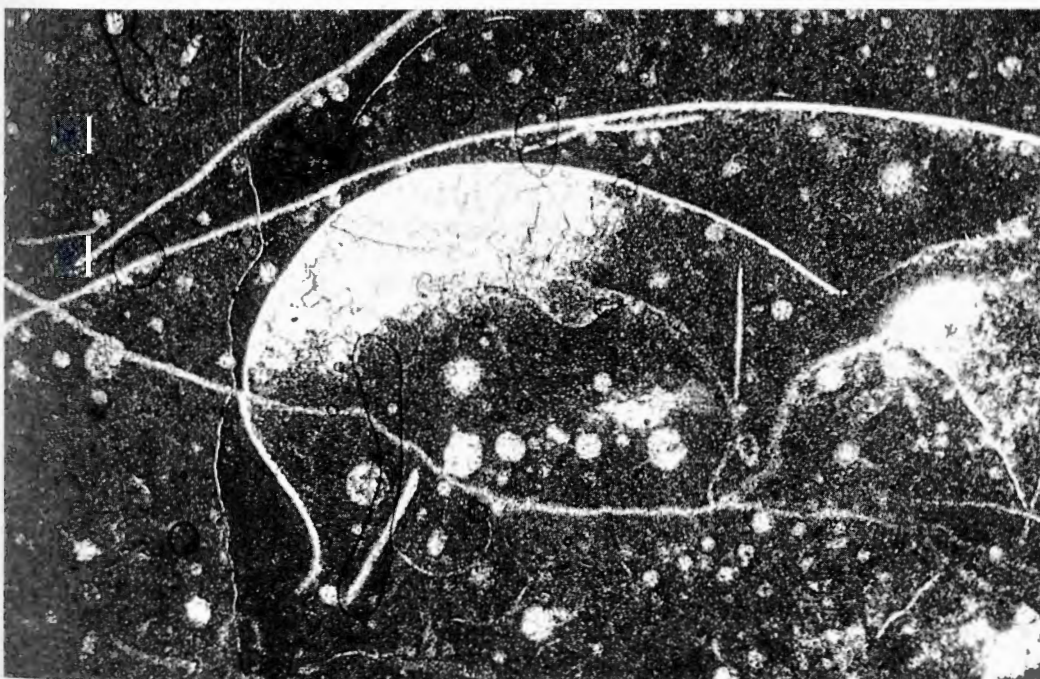


Pelagic pelecypods (*Posidonia*) (X 15).
LADINIAN of Val Gola, Trentino, Italy.

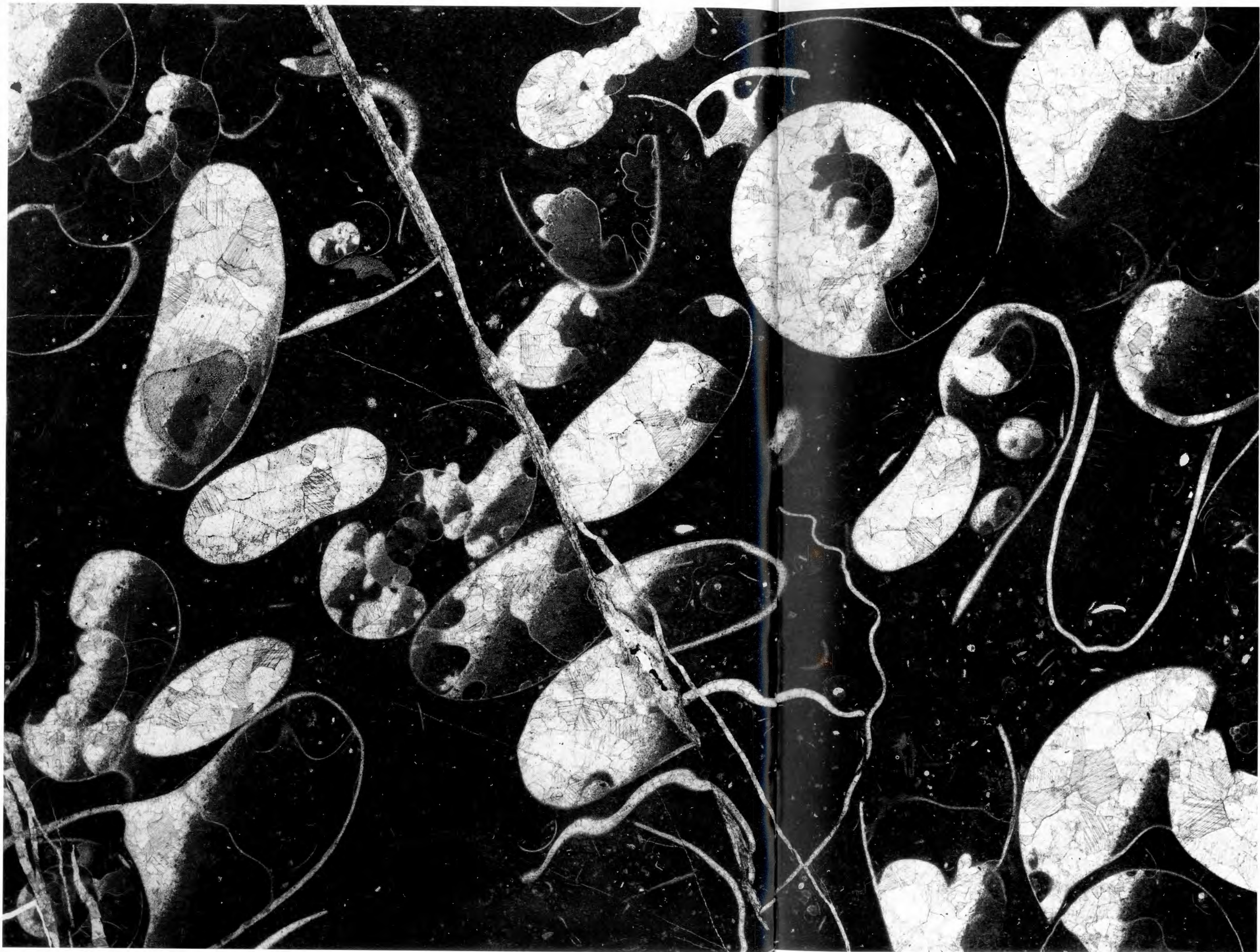
Basinal facies with pelagic pelecypods take on a remarkable importance from the LADINIAN to the JURASSIC.



Pelagic pelecypods (*Daonella* and *Halobia*). Radiolarians are present (X 45).
CARNIAN of S. Cassiano, Trentino, Italy.



Pelagic pelecypods (*Daonella* and *Halobia*). Radiolarians are present (X 30).
CARNIAN of Acque Bianche, Sicily, Italy.

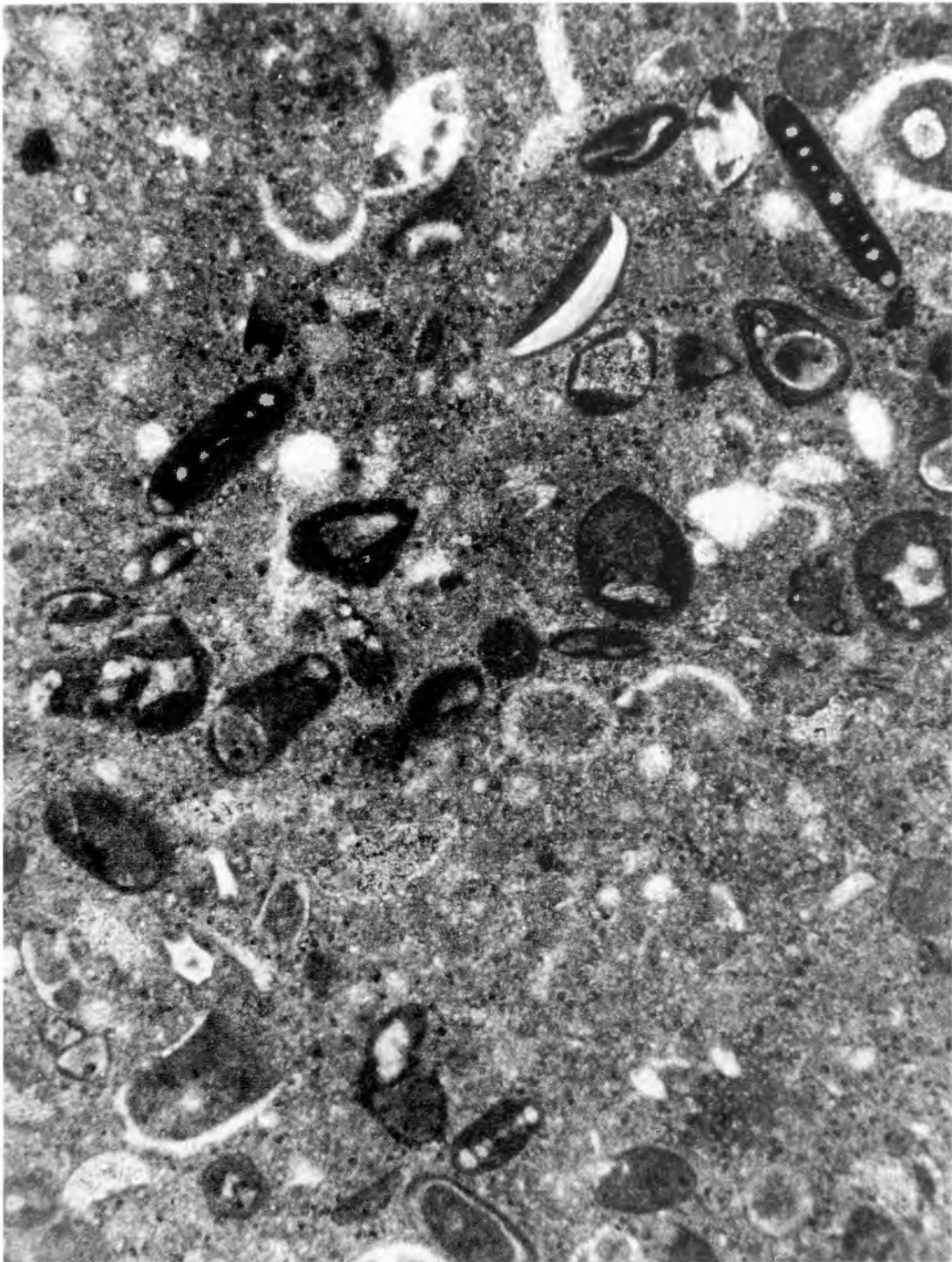


JURASSIC

EPOCHS & AGES

Agip		Ma	Haq et Al. 1987 (modified)		Ma
LATE	TITHONIAN	131	LATE	PORTLANDIAN	131
	KIMMERIDGIAN	136		KIMMERIDGIAN	133,8
	OXFORDIAN	139,5		OXFORDIAN	136
		143			140
MIDDLE	CALLOVIAN	149	MIDDLE	CALLOVIAN	145
	BATHONIAN	156		BATHONIAN	152
	BAJOCIAN	165		BAJOCIAN	157
	AALENIAN	171		AALENIAN	165
		179			171
EARLY	TOARCIAN	186	EARLY	TOARCIAN	179
	PLIENSACHIAN	194		PLIENSACHIAN	186
	SINEMURIAN	201		SINEMURIAN	194
	HETTANGIAN	210		HETTANGIAN	201





Opposite page
Involutina liassica (JONES) (X 15).
 LOWER LIAS of Mendrisio, Canton Ticino,
 Switzerland.

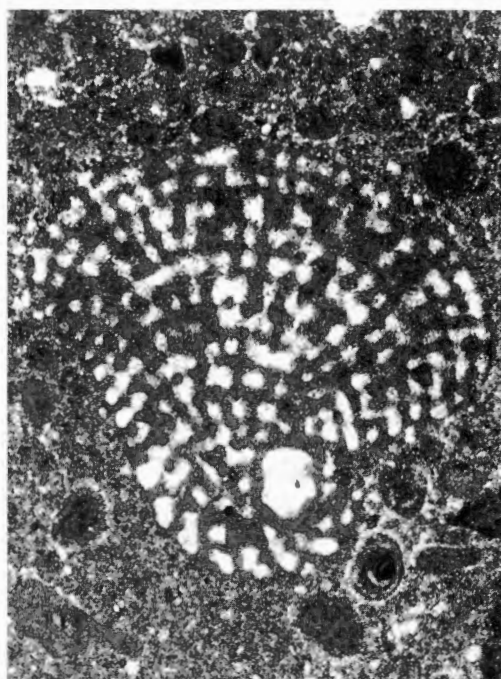
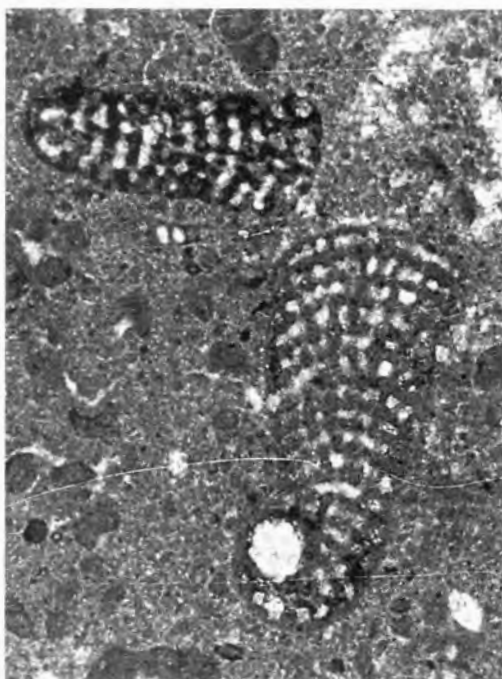
LIAS				DOGGER				MALM		
HETTANGIAN	SNEMURIAN	PLEINSBACHIAN	TOARCAN	ALENIAN	BALOCAN	BATHONIAN	CALLOVIAN	OXFORDIAN	KIMMERIDGIAN	TITHONIAN



"Vidalina" martana FARINACCI (X 60).
 LOWER LIAS of Epiro, Greece.

LIAS				DOGGER				MALM		
HETTANGIAN	SNEMURIAN	PLEINSBACHIAN	TOARCAN	ALENIAN	BALOCAN	BATHONIAN	CALLOVIAN	OXFORDIAN	KIMMERIDGIAN	TITHONIAN

"Vidalina" martana FARINACCI (X 70).
 LIAS of Val Noana, Trentino, Italy.



Orbitopsella praecursor (GÜMBEL) (form A)
(X 45) (left).
MIDDLE LIAS of Cupello 19 well, Abruzzo,
Italy.

Orbitopsella praecursor (GÜMBEL)
(form A) (X 45) (right).
MIDDLE LIAS of Cupello 19 well, Abruzzo,
Italy.

LIAS				DOGGER				MALM		
HETTANGIAN	SINEMURIAN	PLENSBACHIAN	TOARCAN	ALENIAN	BAJOCIAN	BATHONIAN	CALLOVIAN	OXFORDIAN	KIMMERIDGIAN	TITHONIAN

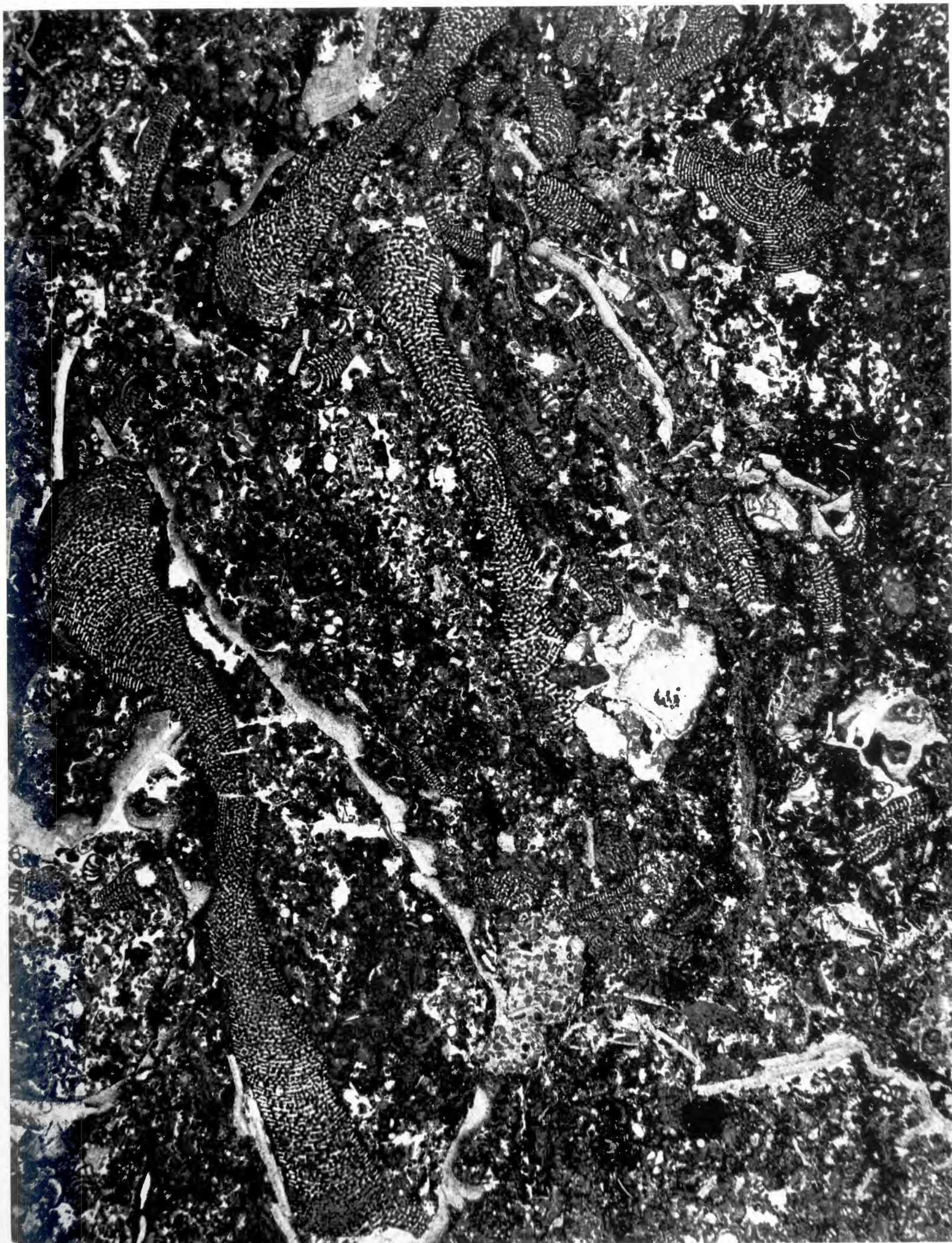


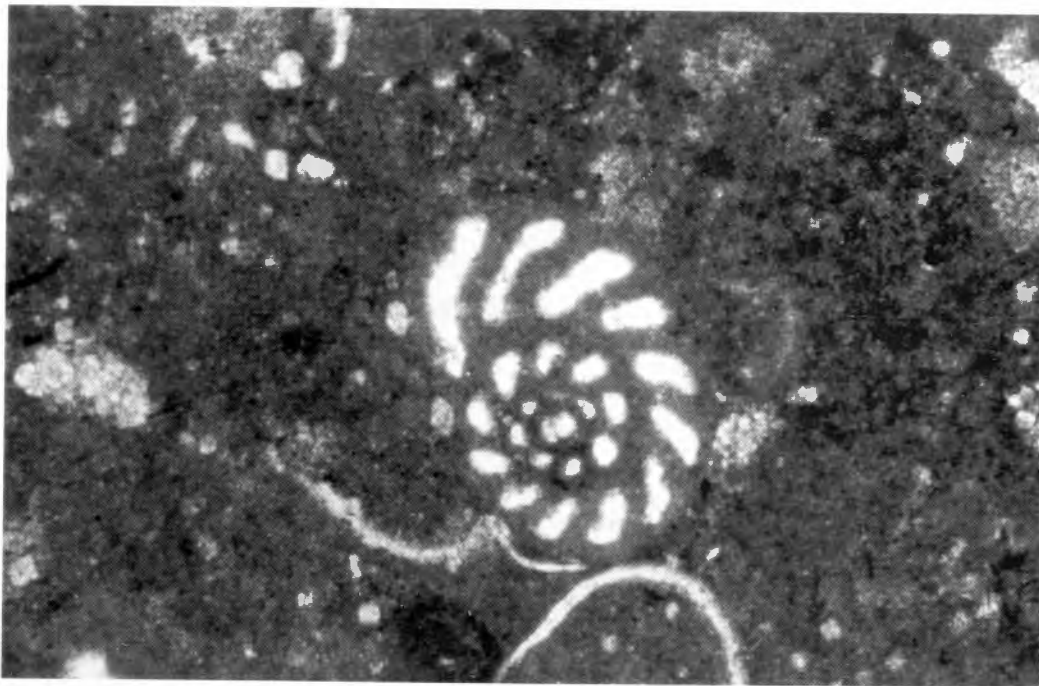
Orbitopsella praecursor (GÜMBEL) (form B)
(X 20).
MIDDLE LIAS of Gaeta, Latium, Italy.



Orbitopsella praecursor (GÜMBEL)
(form A and B) (X 12).
MIDDLE LIAS of Rotzo, Venetia, Italy.

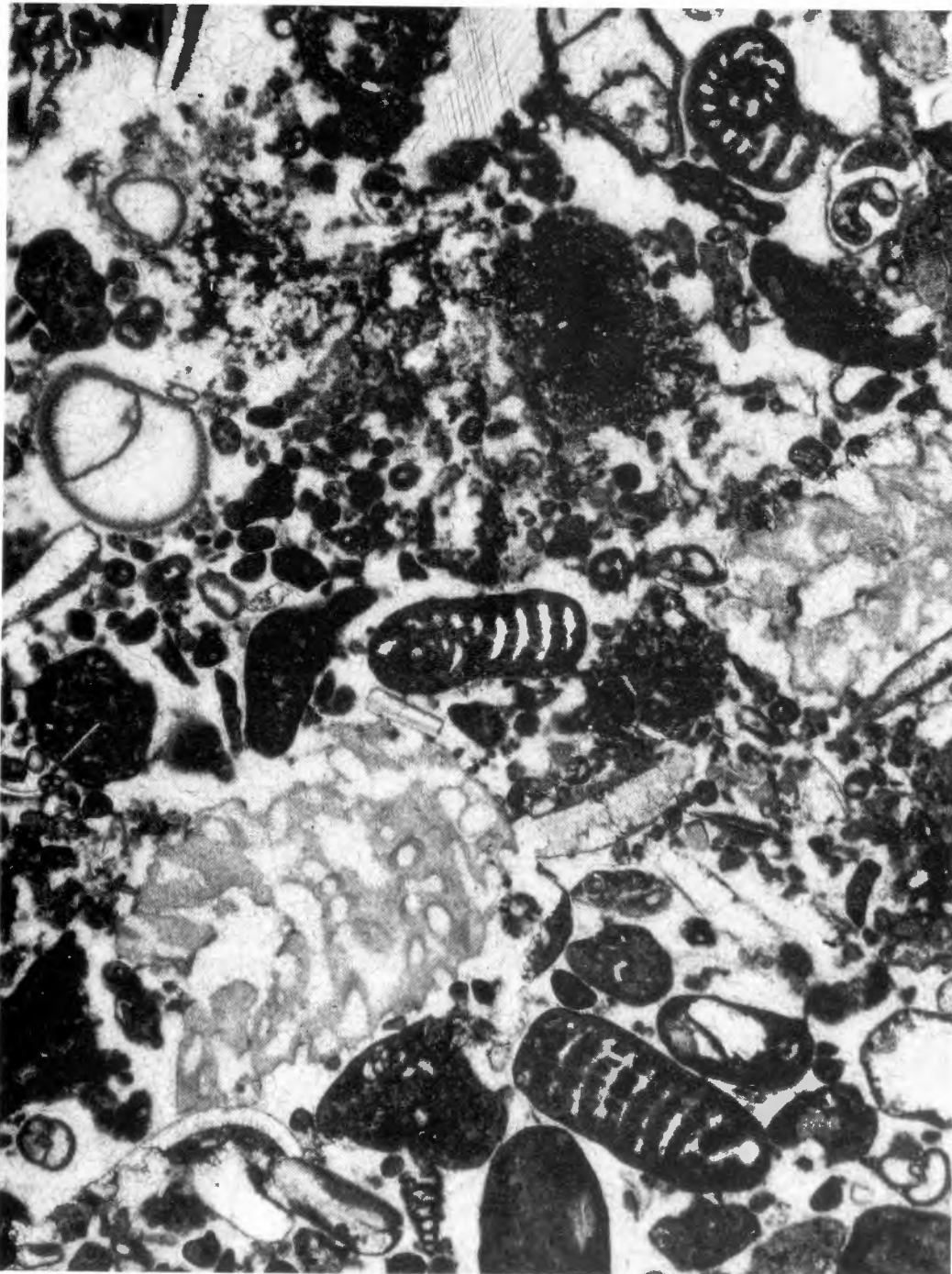
Opposite page
Orbitopsella praecursor (GÜMBEL)
(form A and B) (X 10).
MIDDLE LIAS of Monte Chiunzi,
Campania, Italy.



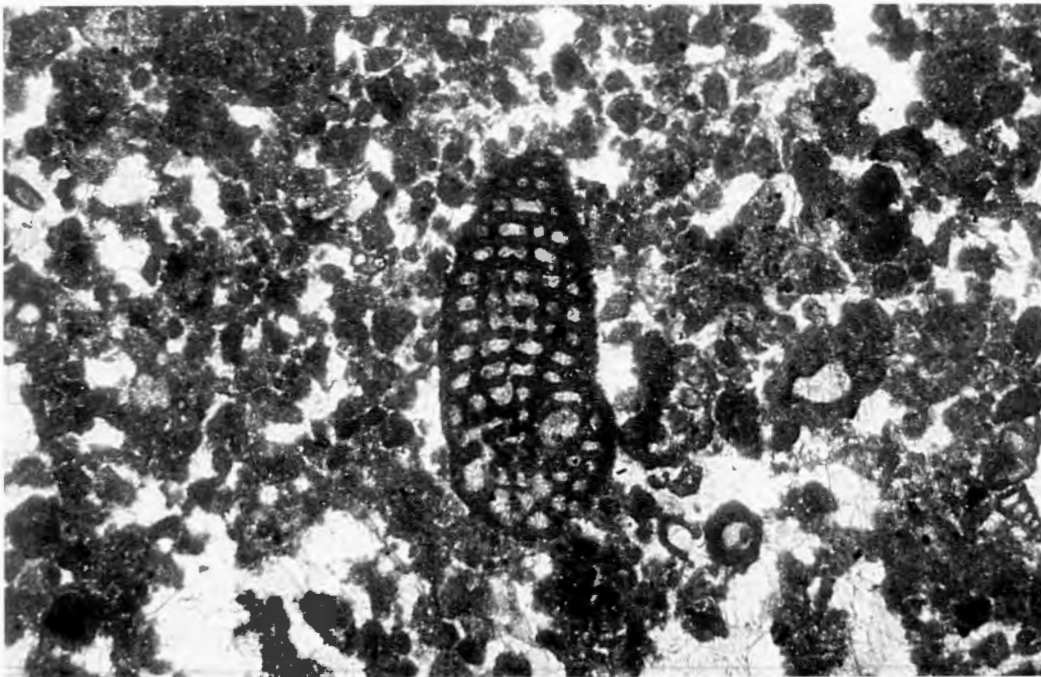


Mayncina termieri HOTTINGER (X 60).
MIDDLE LIAS of Cupello 12 well, Abruzzo,
Italy.

LIAS				DOGGER				MALM		
HETTANGIAN	SINEMURIAN	PLEINSBACHIAN	TOARCAN	ALENIAN	BAJOCCAN	BATHONIAN	CALLOVIAN	OXFORDIAN	KIMMERIDGIAN	TITHONIAN

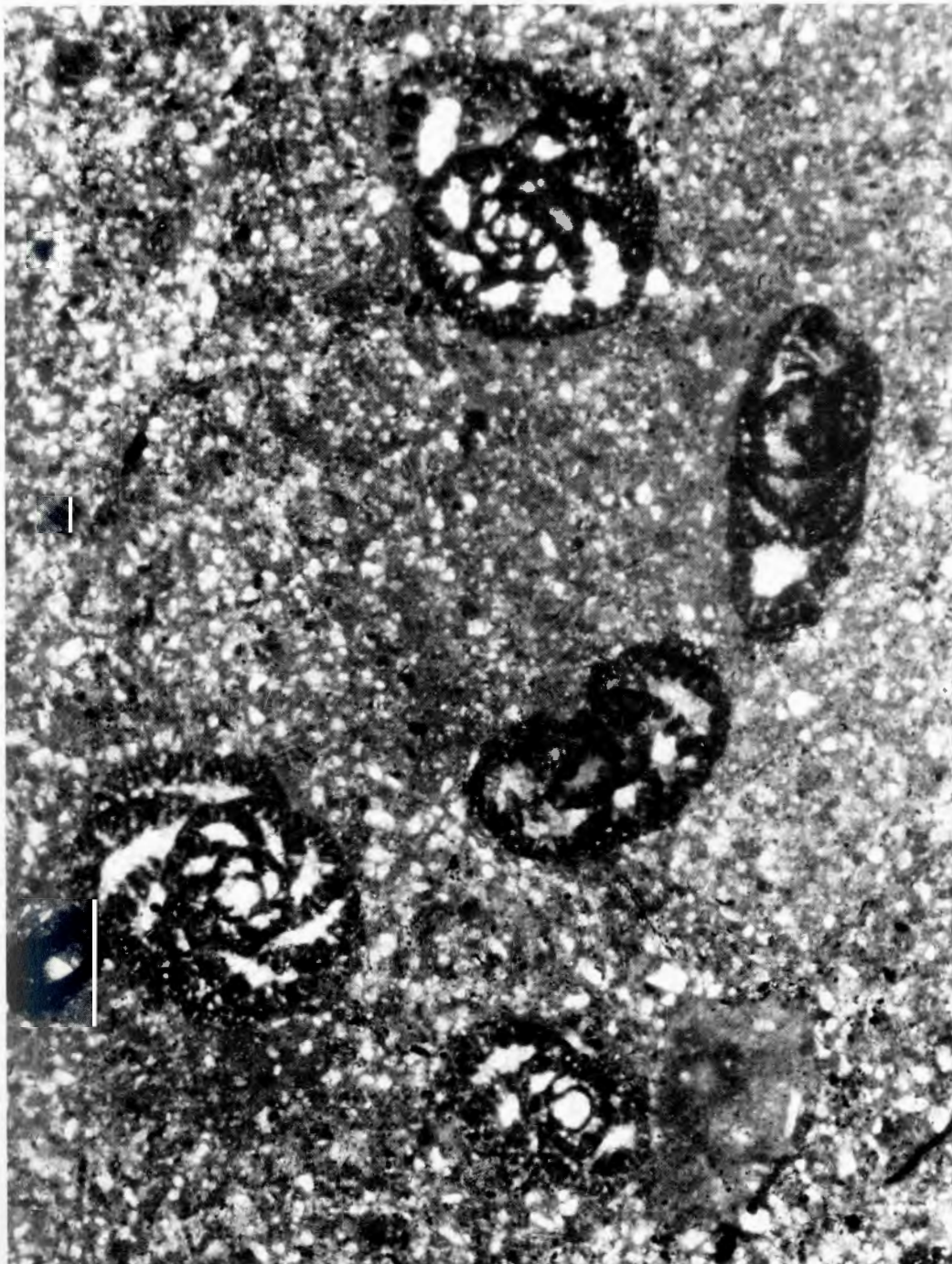


Transitional forms between *Mayncina termieri* and "*Lituosepta*" *compressa* (X 12).
MIDDLE LIAS of Monte Marsicano,
Abruzzo, Italy.



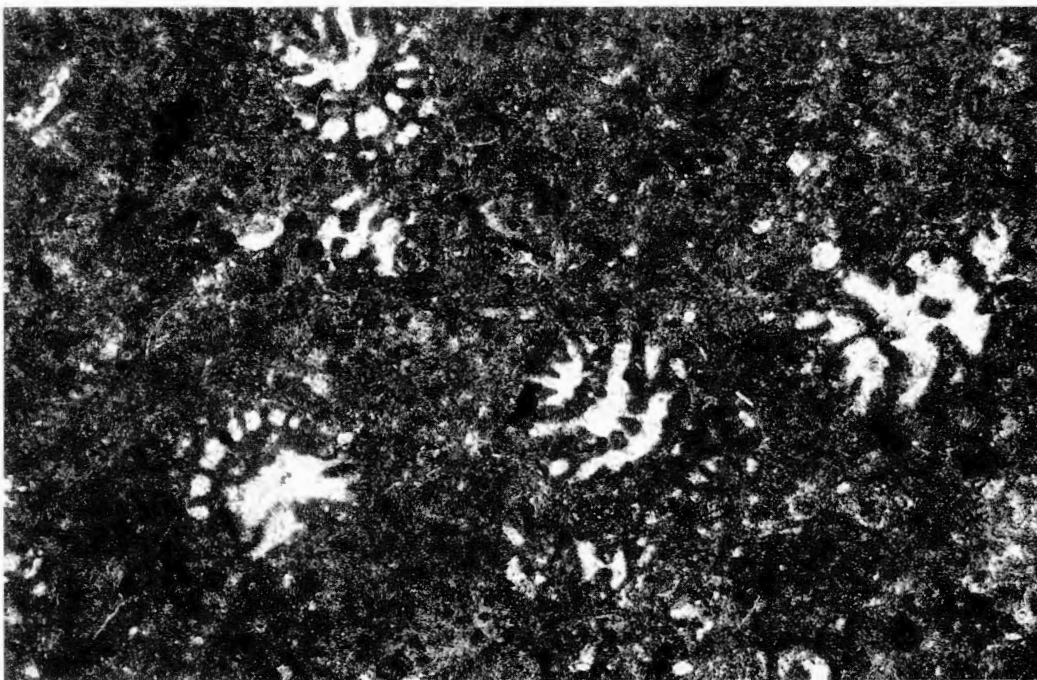
"Lituosepta" compressa HOTTINGER (X 70).
MIDDLE LIAS of Monte Marsicano,
Abruzzo, Italy.

LIAS				DOGGER				MALM			
HETTANGIAN	SINEMURIAN	PUENSCHACHIAN	TOARCICAN	AALÉNIAN	BAJOCCAN	BATHONIAN	CALLOVIAN	OXFORDIAN	KIMMERIDGIAN	TITHONIAN	
		■									



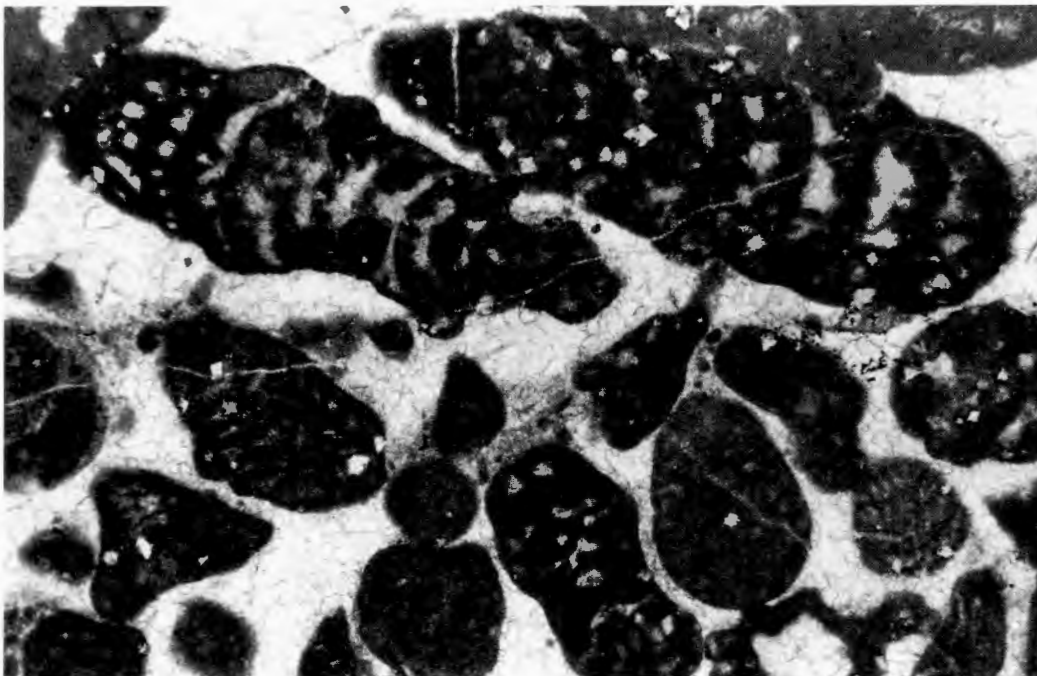
Pseudocyclammina liasica HOTTINGER (form
A) (X 60).
MIDDLE LIAS of Puerto Cansado 1 well,
Morocco.

LIAS				DOGGER				MALM			
HETTANGIAN	SINEMURIAN	PUENSCHACHIAN	TOARCICAN	AALÉNIAN	BAJOCCAN	BATHONIAN	CALLOVIAN	OXFORDIAN	KIMMERIDGIAN	TITHONIAN	
		■									



Haurania amiji HENSON (X 50).
MIDDLE LIAS of Cavone 11 well, Emilia,
Italy.

LIAS				DOGGER				MALM		
HETTANGIAN	Sinemurian	PLENSBACHIAN	TOARCAN	Aalenian	Bajocian	Bathonian	Callovian	Oxfordian	Kimmeridgian	Tithonian



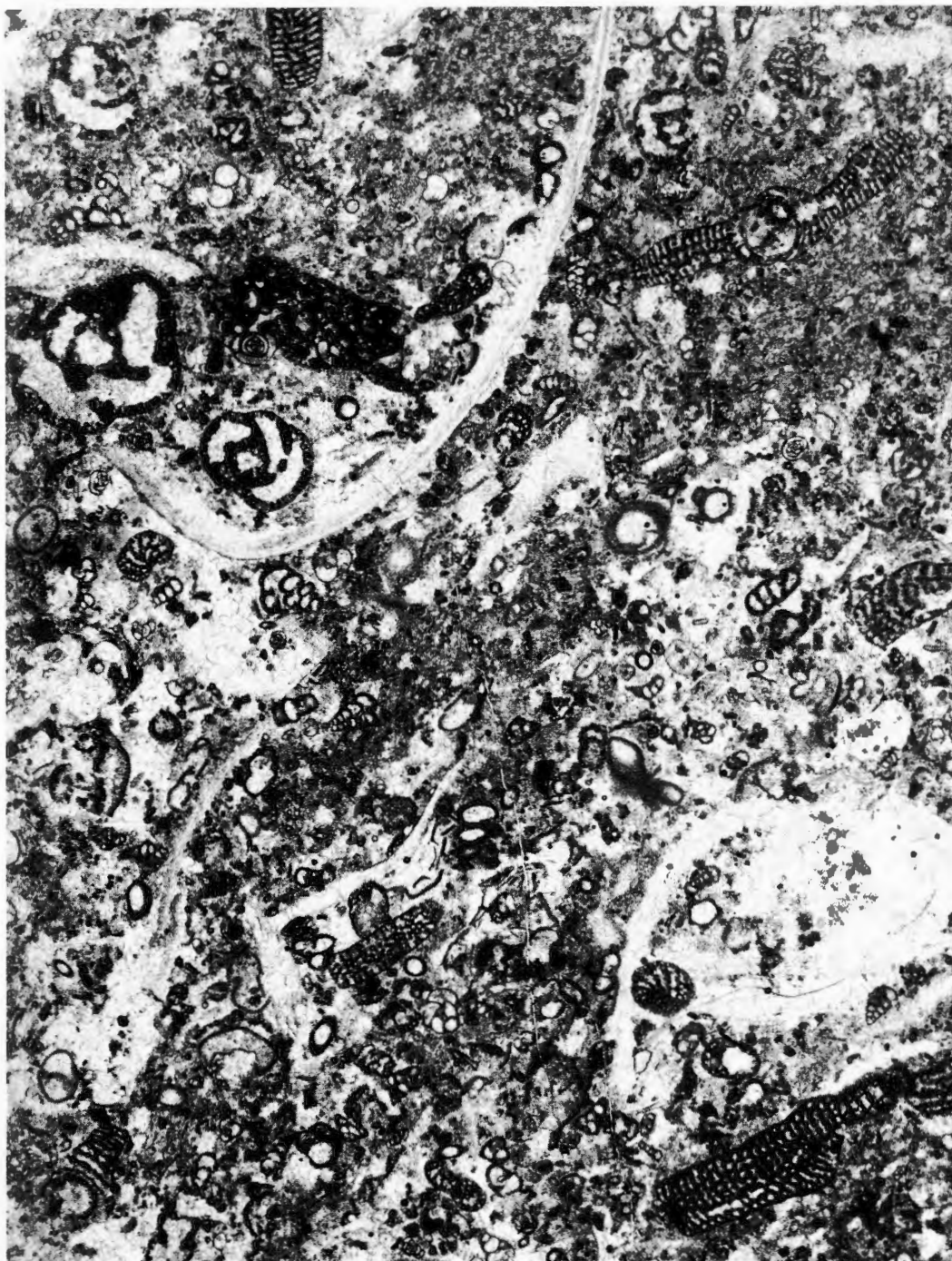
Haurania amiji HENSON (X 40).
MIDDLE LIAS of Monte S. Maria, Abruzzo,
Italy.



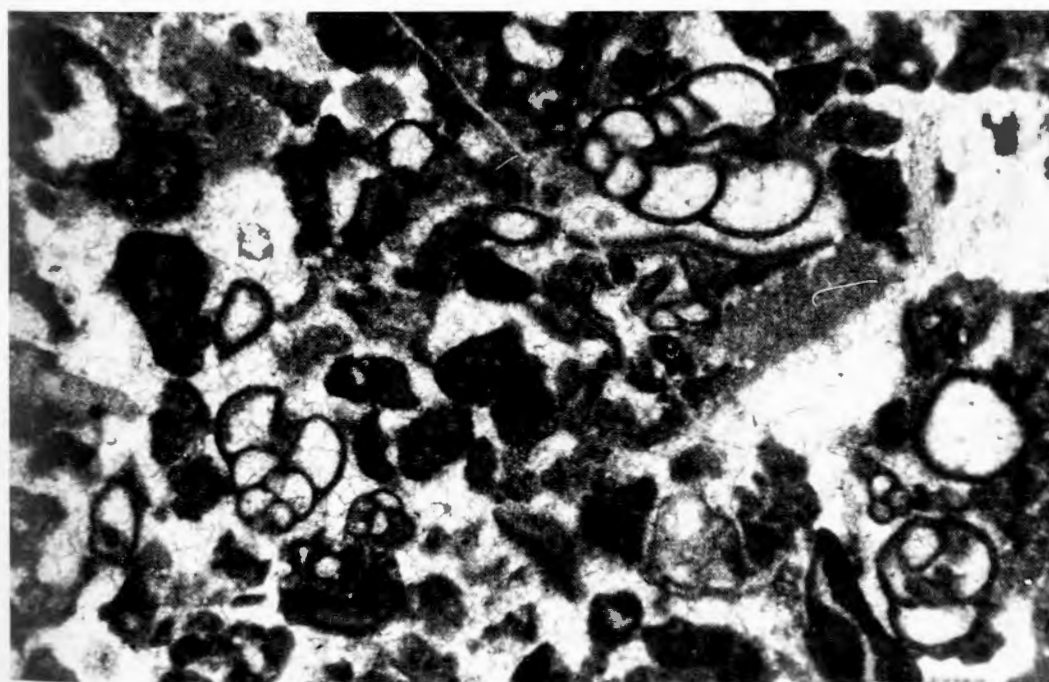
Haurania deserta HENSON (X 40) (left).
MIDDLE LIAS of Cupello 19 well, Abruzzo,
Italy.

Haurania deserta HENSON (X 40) (right).
MIDDLE LIAS of Cupello 19 well, Abruzzo,
Italy.

LIAS				DOGGER				MALM		
HETTANGIAN	Sinemurian	PLENSBACHIAN	TOARCAN	Aalenian	Bajocian	Bathonian	Callovian	Oxfordian	Kimmeridgian	Tithonian



Micropaleontological assemblage with *Orbitopsella*, *Pseudocyclammia liasica* HOTTINGER, *Bosniella oenensis* GÜSIĆ Haurania, Valvulinidae, Textulariidae, *Glomospira*, *Pelecypods* and *Thaumatoporella parvovesiculifera* (RAINERI) (X 15). MIDDLE LIAS of Cavone 11 well, Emilia, Italy.



"*Siphovalvulina*" (X 35). MIDDLE LIAS of Cavone 11 well, Emilia, Italy.

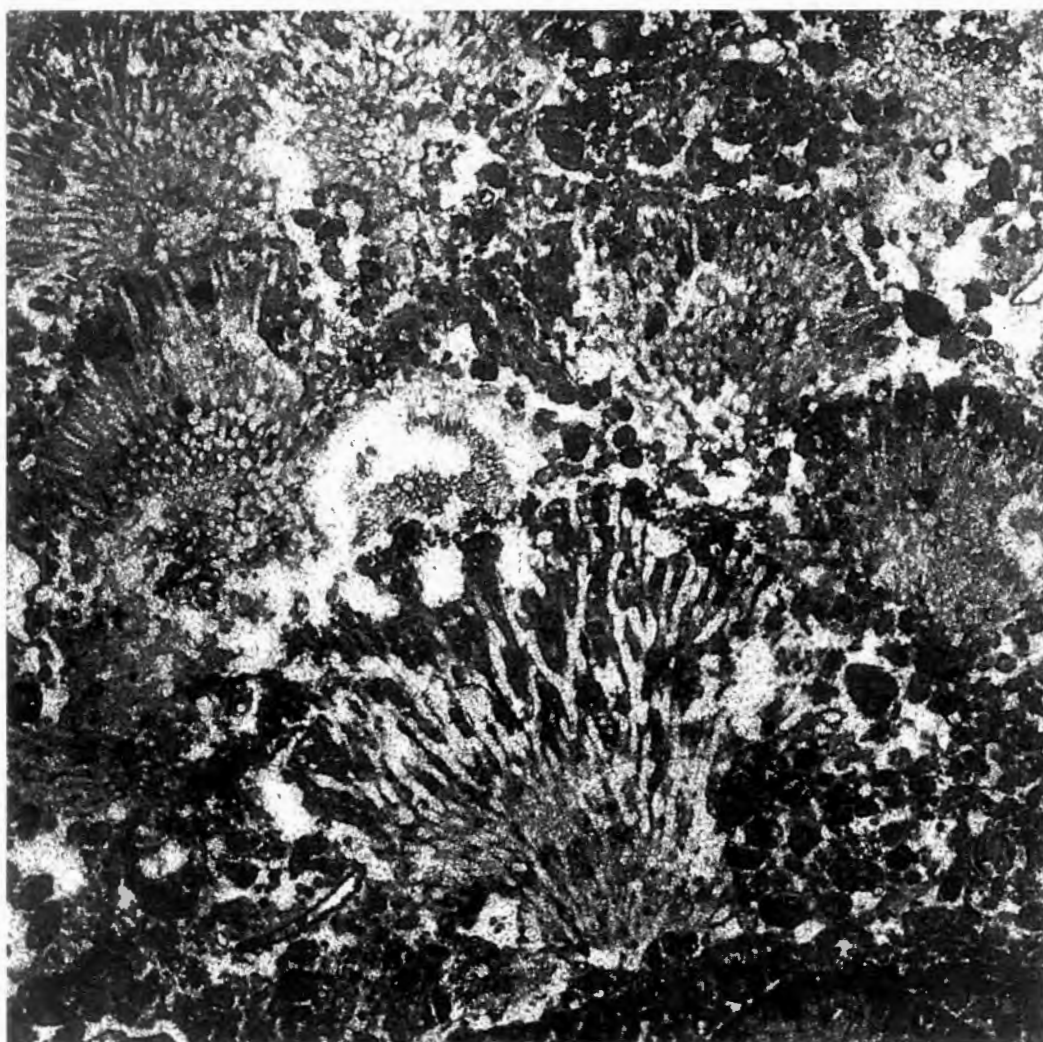
"*Siphovalvulina*", present up to the CRETACEOUS, is remarkably diffused from and during the LIAS.



Thaumtoporella parvovesiculifera (RAINERI) (X 60).

MIDDLE LIAS of Vega 4 well, south-eastern Sicily offshore, Italy.

Thaumtoporella, present from the TRIASSIC to the LATE CRÉTACEOUS, is very common in liassic platform facies.



Cayeuxia piaë FROLLO (X 20).

LIAS of Gola della Rossa, Marche, Italy.

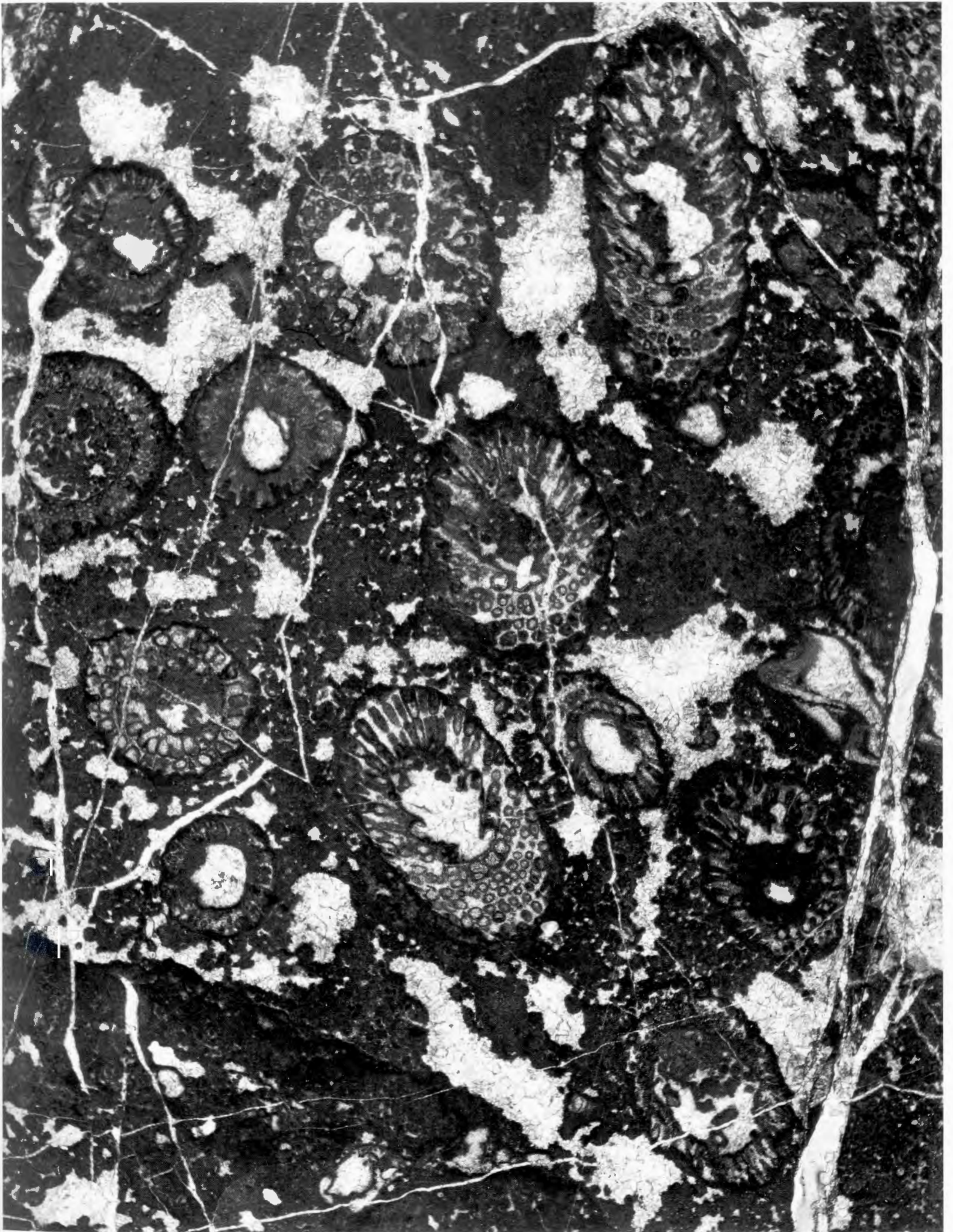
This alga, very common in the LIAS, is present throughout the JURASSIC and in the EARLY CRÉTACEOUS.

Opposite page

Palaeodasyclus mediterraneus (PIA) (X 16).

MIDDLE LIAS of Tramutola, Basilicata, Italy.

LIAS				DOGGER				MALM		
HETTANGIAN	Sinemurian	PIEUSCHIAN	TOARCAN	Aalenian	Bajocian	Bathonian	Callovian	Oxfordian	Kimmeridgian	Tithonian

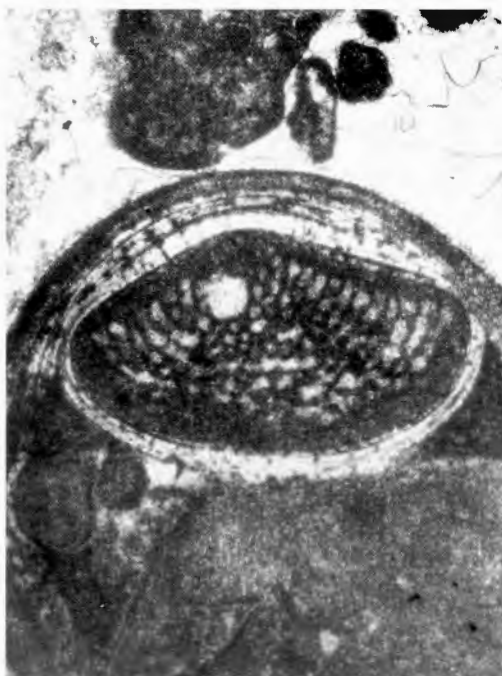




Lucasella cayeuxi (LUCAS). *Spiroconulus perconigi* HENSON, ammonites and gastropods are present (X 9). AALENIAN-BAJOCIAN of Settefrati, Latium, Italy.



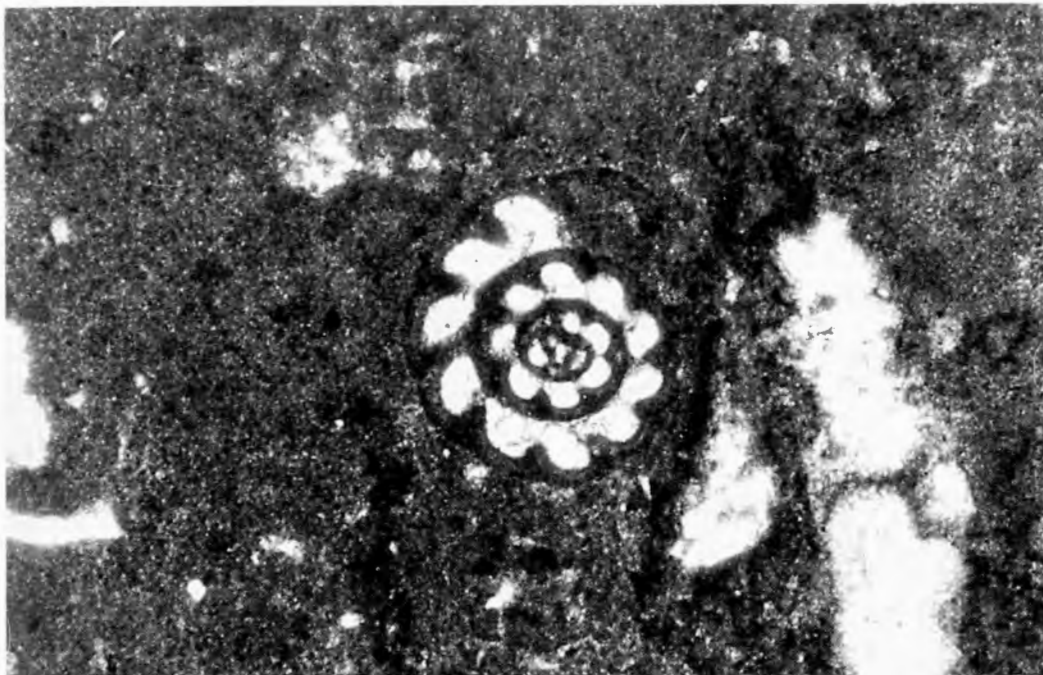
Lucasella cayeuxi (LUCAS) (X 20) (left). AALENIAN-BAJOCIAN of Settefrati, Latium, Italy.



Lucasella cayeuxi (LUCAS) (X 50) (right). AALENIAN-BAJOCIAN of Settefrati, Latium, Italy.

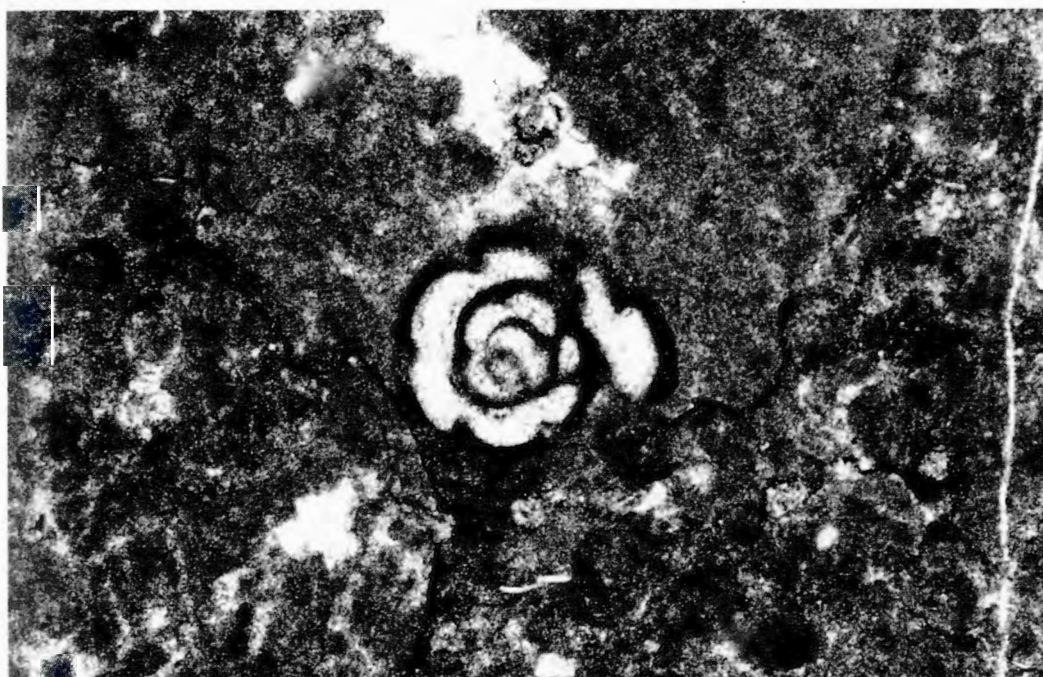
LIAS				DOGGER				MALM		
HETTANGIAN	SINEMURIAN	PLENSCHACHIAN	TORCHIAN	AALENIAN	BAJOCIAN	BATHONIAN	CALLOVIAN	OXFORDIAN	KIMMERIDGIAN	TITHONIAN

This is one of the oldest forms with orbitoliniform test.

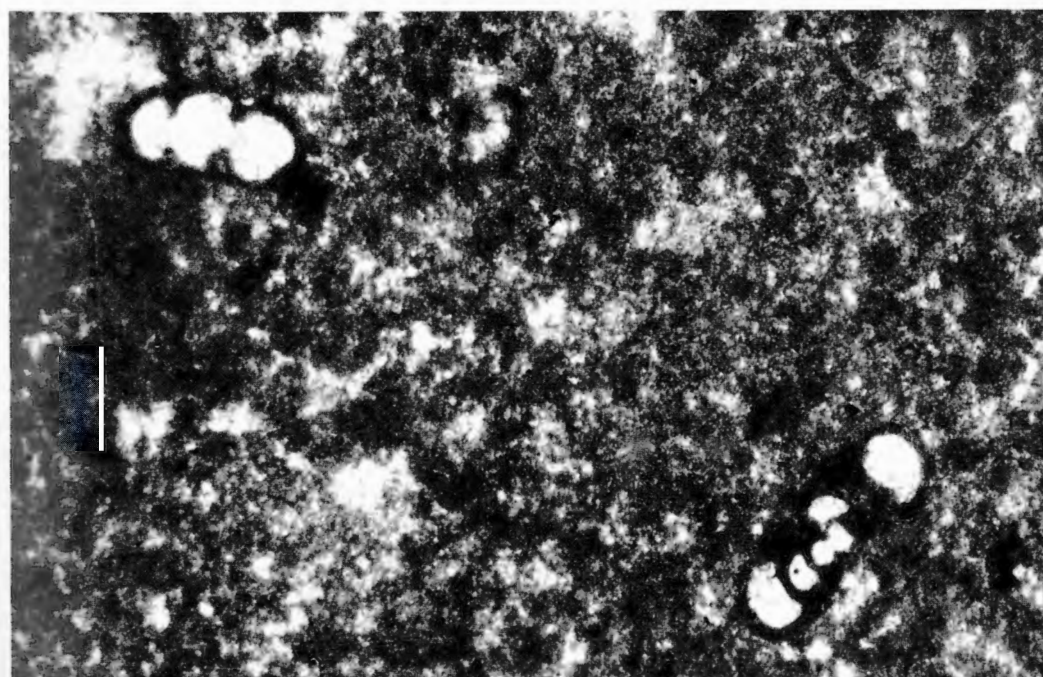


Mesoendothyra croatica GUŠIĆ (X 80).
DOGGER of Mali Halan, Yugoslavia.

LIAS				DOGGER				MALM		
HETTANGIAN	Sinemurian	PLENSBACHIAN	TOARCIAN	AALENIAN	BAJOCCAN	BATHONIAN	CALLOVIAN	OXFORDIAN	KIMMERIDGIAN	TITHONIAN



Mesoendothyra croatica GUŠIĆ (X 100).
DOGGER of Mali Halan, Yugoslavia.



Mesoendothyra croatica GUŠIĆ (X 65).
DOGGER of Mali Halan, Yugoslavia.



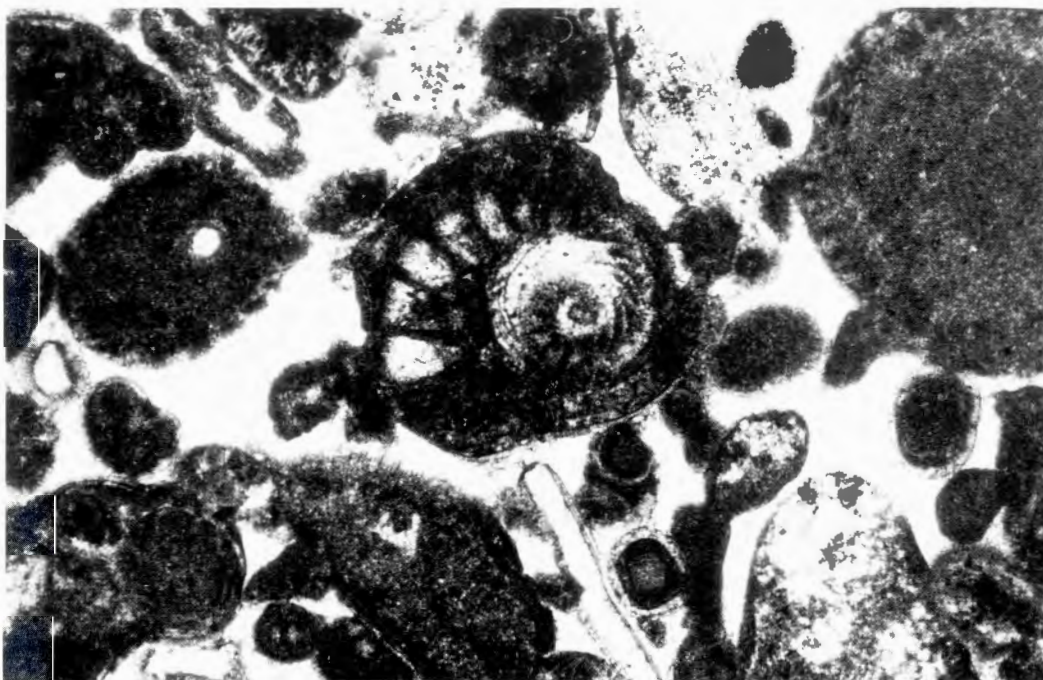
Selliporella donzellii SARTONI & CRESCENTI
and *Neoteutloporella gallaeformis*
(RADOIČIĆ) (X 10).
BAJOCIAN-BATHONIAN of Cupello 19
well, Abruzzo, Italy.

LIAS				DOGGER				MALM		
HETTANGIAN	Sinemurian	PIELENBACHIAN	TOARCICAN	AALENIAN	BAJOCIAN	BATHONIAN	CALLOVIAN	OXFORDIAN	KIMMERIDGIAN	TITHONIAN

Probably these two forms belong to the same
species.

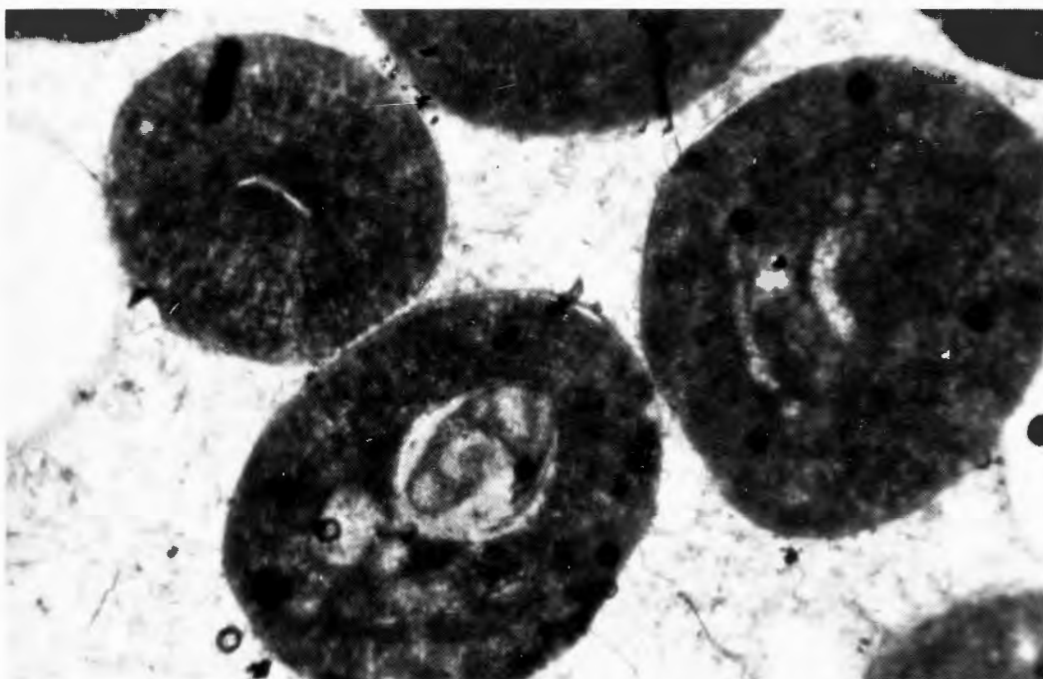


Selliporella donzellii SARTONI & CRESCENTI.
Corals are present (X 10).
BAJOCIAN-BATHONIAN of Nocera
Inferiore, Campania, Italy.



Protopenneroplis striata WEYNSCHENK (X 50).
DOGGER of Soverzene, Venetia, Italy.

LIAS				DOGGER				MALM		
HETTANGIAN	SINEMURIAN	PLENSBACHIAN	TOARCIAN	AALENIAN	BAJOCCAN	BATHONIAN	CALLOVIAN	OXFORDIAN	KIMMERIDGIAN	TITHONIAN



Protopenneroplis striata WEYNSCHENK (X 90).
DOGGER of Matumbi Hills, Tanzania.

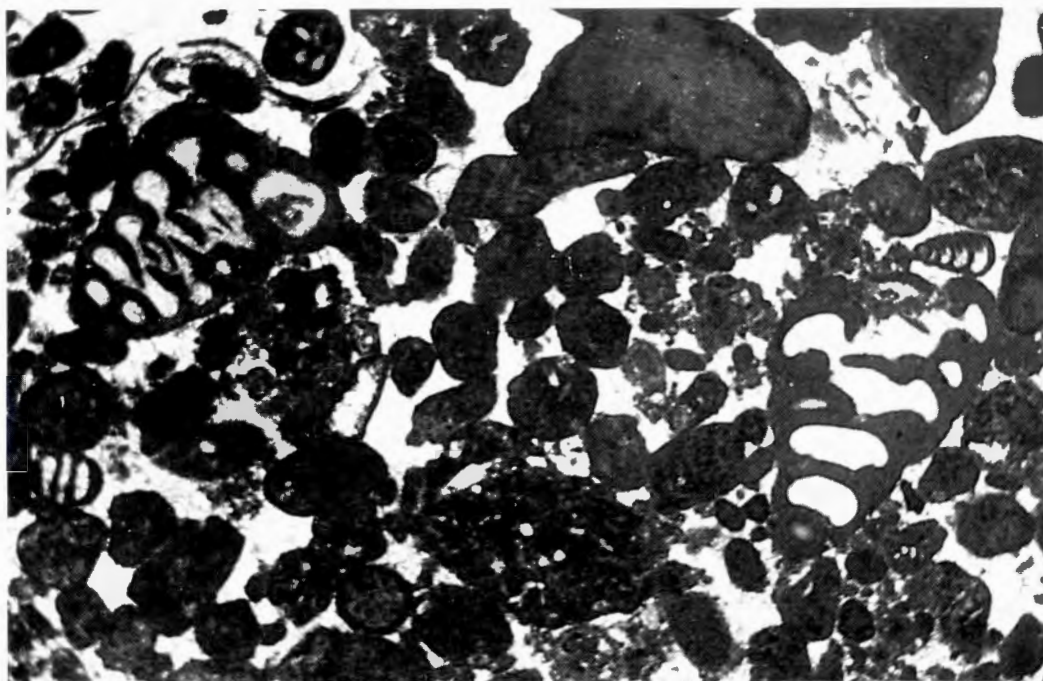
Oolitic facies with *Protopenneroplis* are present in Tanzania and Madagascar. They identify the extreme southern border of the Southern Tethys Domain during the JURASSIC.

COLL.: BALDUZZI



Protopenneroplis striata WEYNSCHENK (X 50).
DOGGER of Kizimbani, Tanzania.

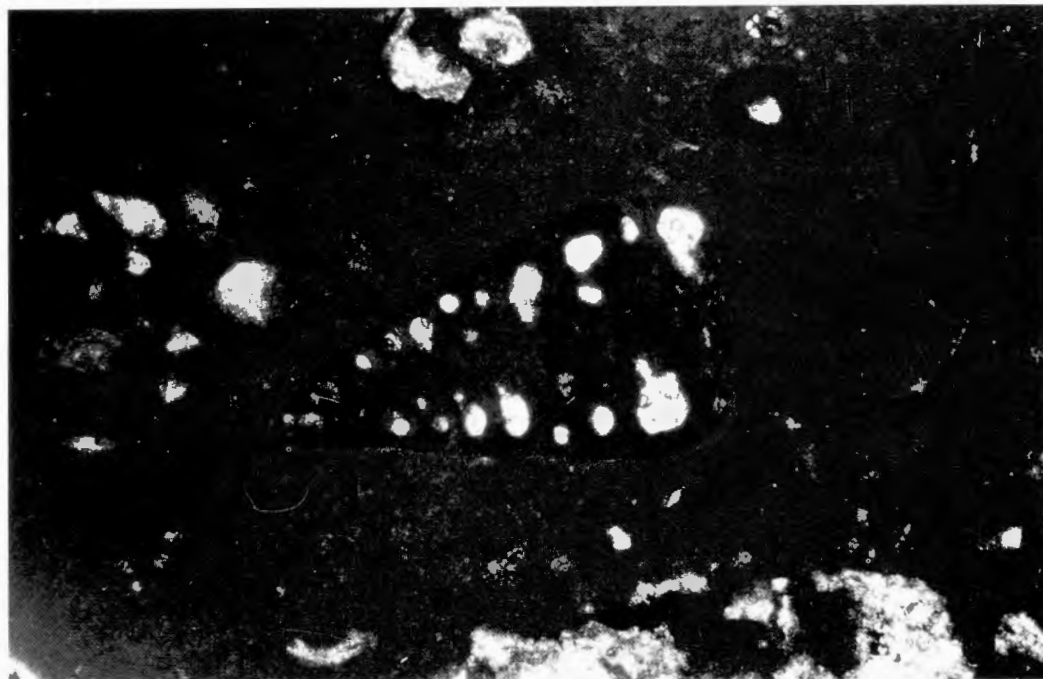
COLL.: BALDUZZI



Valvulina lugeoni SEPTFONTAINE (X 40).
BAJOCIAN-BATHONIAN of Filettino,
Latium, Italy.

LIAS				DOGGER				MALM		
HETTANGIAN	SNEMURIAN	PLEINSBACHIAN	TOARCAN	ALENIAN	BAJOCIAN	BATHONIAN	CALLOVIAN	OXFORDIAN	KIMMERIDGIAN	TITHONIAN

This genus seems to descend from "*Siphovalvulina*".



Pfenderella arabica REDMOND (X 55).
MALM of Cupello 19 well, Abruzzo, Italy.

LIAS				DOGGER				MALM		
HETTANGIAN	SNEMURIAN	PLEINSBACHIAN	TOARCAN	ALENIAN	BAJOCIAN	BATHONIAN	CALLOVIAN	OXFORDIAN	KIMMERIDGIAN	TITHONIAN

These *Valvulinidae* seem to represent the transitional forms between *Valvulina* and *Pfenderina*.



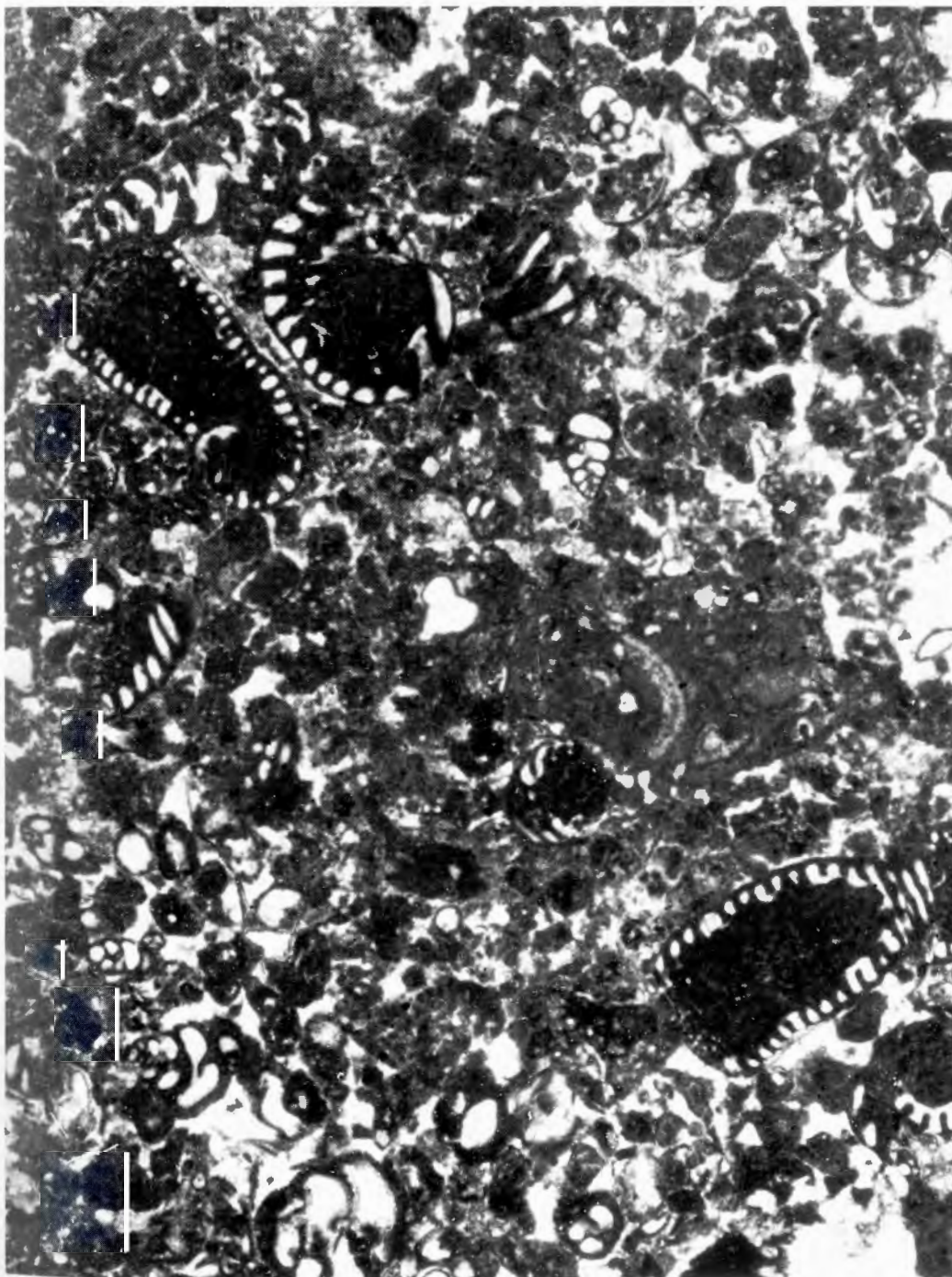
Pfenderina salernitana SARTONI & CRESCENTI
(X 50).
BATHONIAN-CALLOVIAN of Acerno,
Campania, Italy.

LIAS				DOGGER				MALM		
HETTANGIAN	SNEMURIAN	PLEINSBACHIAN	TOARCAN	ALENIAN	BAJOCIAN	BATHONIAN	CALLOVIAN	OXFORDIAN	KIMMERIDGIAN	TITHONIAN



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Pfenderina salernitana SARTONI & CRESCENTI, *Pfenderinidae* (X 40).
BATHONIAN-CALLOVIAN of Acerno,
Campania, Italy.



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Satorina apuliensis FOURCADE & CHOROWICS.
? *Pfenderina trochoidea* SMOUT & SUDGEN,
Pfenderina salernitana SARTONI & CRESCENTI
and *Valvulinidae* are present (X 25).
Detail (X 30).
BATHONIAN of Monte Sorgenza, Latium,
Italy.

LIAS				DOGGER				MALM			
HETTANGIAN	SINEMURIAN	PLENSBACHIAN	TOARCAN	AALENIAN	BAIJOCAN	BATHONIAN	CALLOVIAN	OXFORDIAN	KIMMERIDGIAN	TITHONIAN	

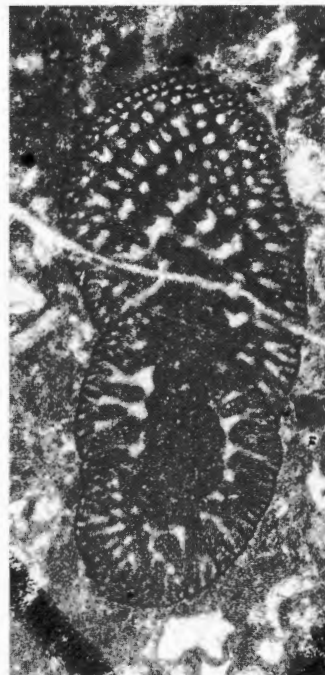
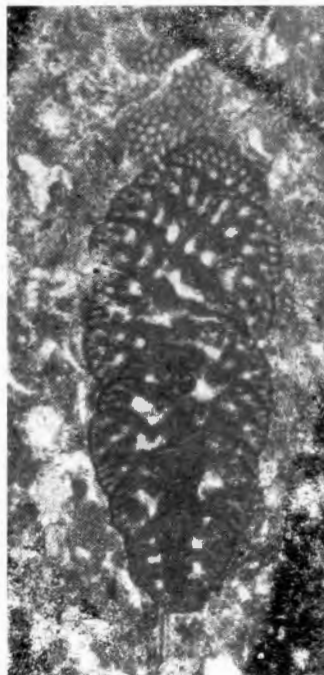
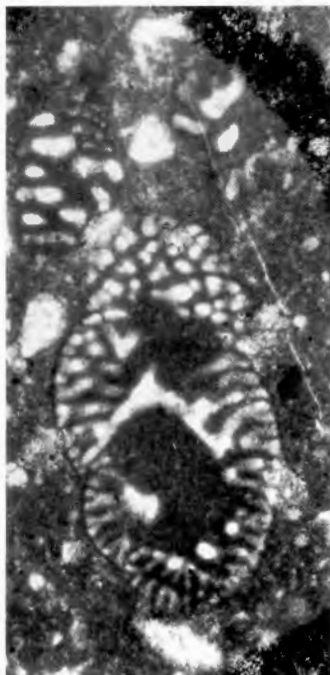




Praekurnubia crusei REDMOND (X 80).
Detail (X 80).
CALLOVIAN of Monte S. Angelo,
Gargano, Apulia, Italy.

LIAS				DOGGER				MALM		
HETTANGIAN	SNEURIAN	PLENSBACHIAN	TOARCAN	ALENIAN	BAJOCCAN	BATHONIAN	CALLOVIAN	OXFORDIAN	KIMMERIDGIAN	TITHONIAN

This genus appears to be the ancestor of *Kurnubia*.



Kurnubia palastiniensis HENSON (X 50)
(left).
OXFORDIAN-KIMMERIDGIAN of Kuh-e-
Dinar, Zagros, Iran.

Kurnubia palastiniensis HENSON (X 50)
(middle).
OXFORDIAN-KIMMERIDGIAN of Kuh-e-
Dinar, Zagros, Iran.

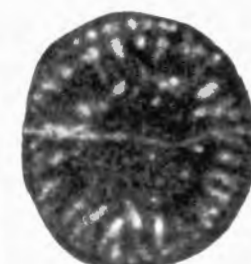
Kurnubia palastiniensis HENSON (X 50)
(right).
OXFORDIAN-KIMMERIDGIAN of Kuh-e-
Dinar, Zagros, Iran.

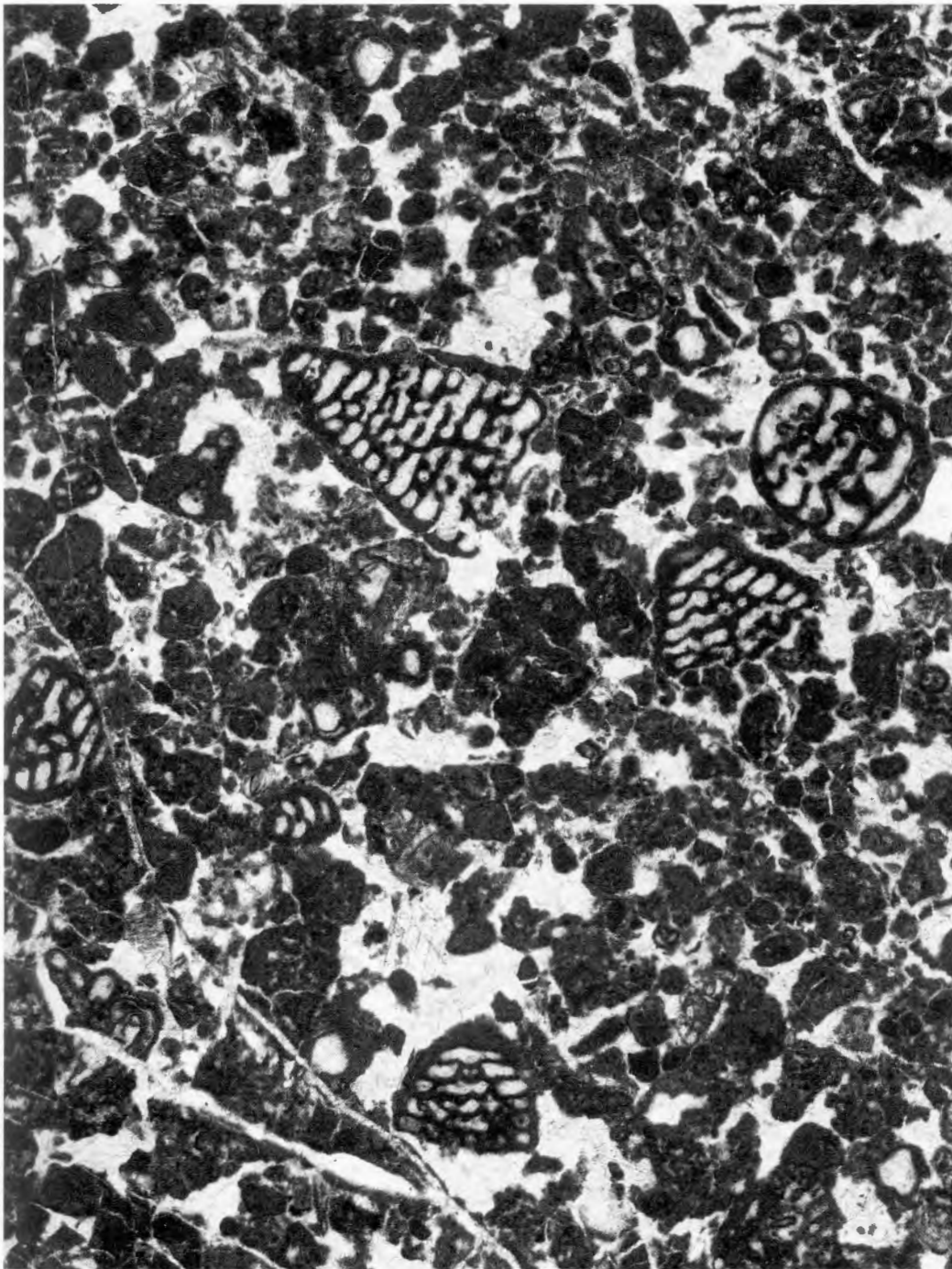
LIAS				DOGGER				MALM		
HETTANGIAN	SNEURIAN	PLENSBACHIAN	TOARCAN	ALENIAN	BAJOCCAN	BATHONIAN	CALLOVIAN	OXFORDIAN	KIMMERIDGIAN	TITHONIAN



Conicokurnubia (X 40). Detail (X 70).
KIMMERIDGIAN of Pacentro, Abruzzo,
Italy.

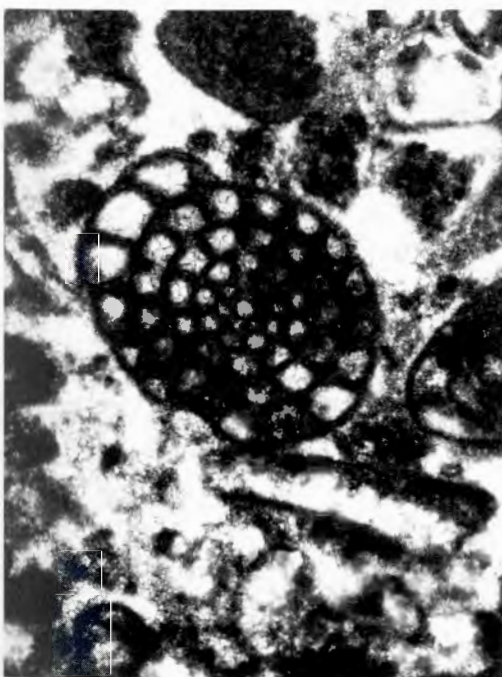
LIAS				DOGGER				MALM		
HETTANGIAN	SNEURIAN	PLENSBACHIAN	TOARCAN	ALENIAN	BAJOCCAN	BATHONIAN	CALLOVIAN	OXFORDIAN	KIMMERIDGIAN	TITHONIAN





Parurgonina caelinensis CUVILLIER, FOURY & PIGNATTI MORANO (X 25).
KIMMERIDGIAN of Cellina Valley, Friuli,
Italy.

LIAS				DOGGER				MALM		
HETTANGIAN	Sinemurian	Pliensbachian	Toarcian	Aalenian	Bajocian	Bathonian	Callovian	Oxfordian	Kimmeridgian	Tithonian

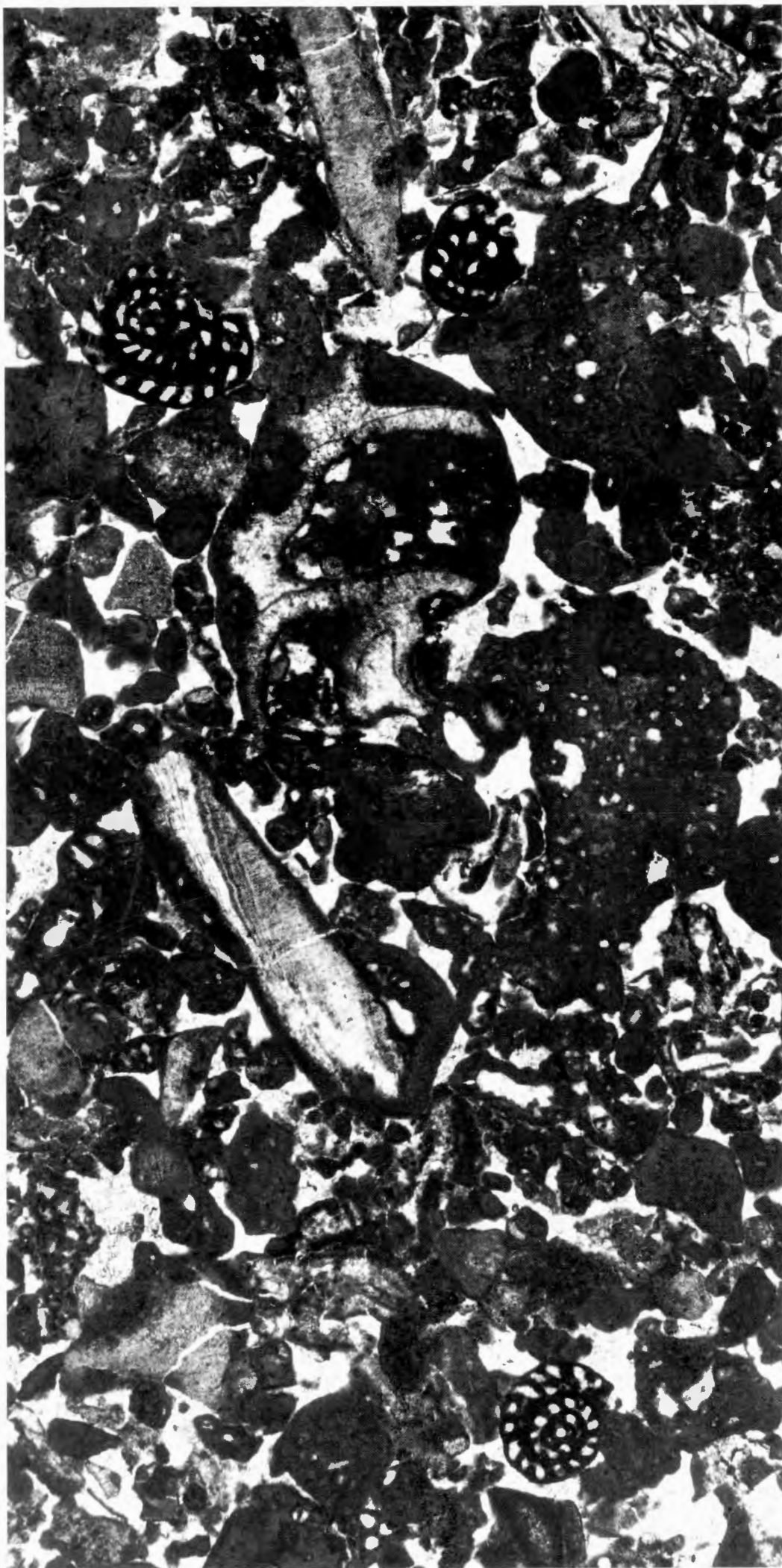


Nautiloculina oolithica MOHLER (X 70) (left).
MALM of Bazman, Zagros, Iran.

Nautiloculina oolithica MOHLER (X 70) (right).
MALM of Dinar, Zagros, Iran.

LIAS				DOGGER				MALM		
HETTANGIAN	Sinemurian	Pliensbachian	Toarcian	Aalenian	Bajocian	Bathonian	Callovian	Oxfordian	Kimmeridgian	Tithonian

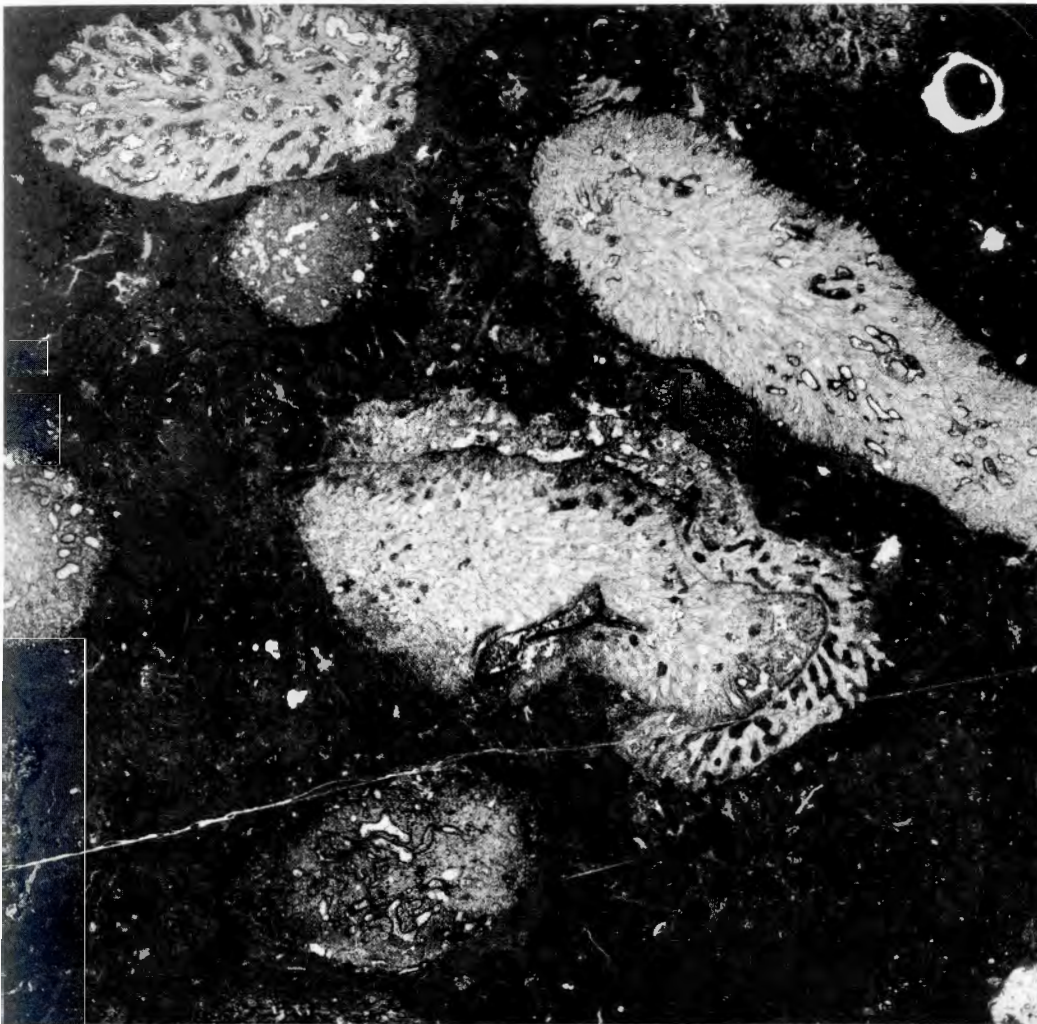
Nautiloculina is present with other species also
throughout the EARLY CRETACEOUS.



Labyrinthina mirabilis WEYNSCHENK (X 30).
Detail (X 45).
KIMMERIDGIAN of Cellina Valley, Friuli,
Italy.

LIAS				DOGGER				MALM		
HETTANGIAN	SINEMURIAN	PUENSBACHIAN	TOARCAN	ALENIAN	BAJOCCAN	BATHONIAN	CALLOVIAN	OXFORDIAN	KIMMERIDGIAN	TITHONIAN

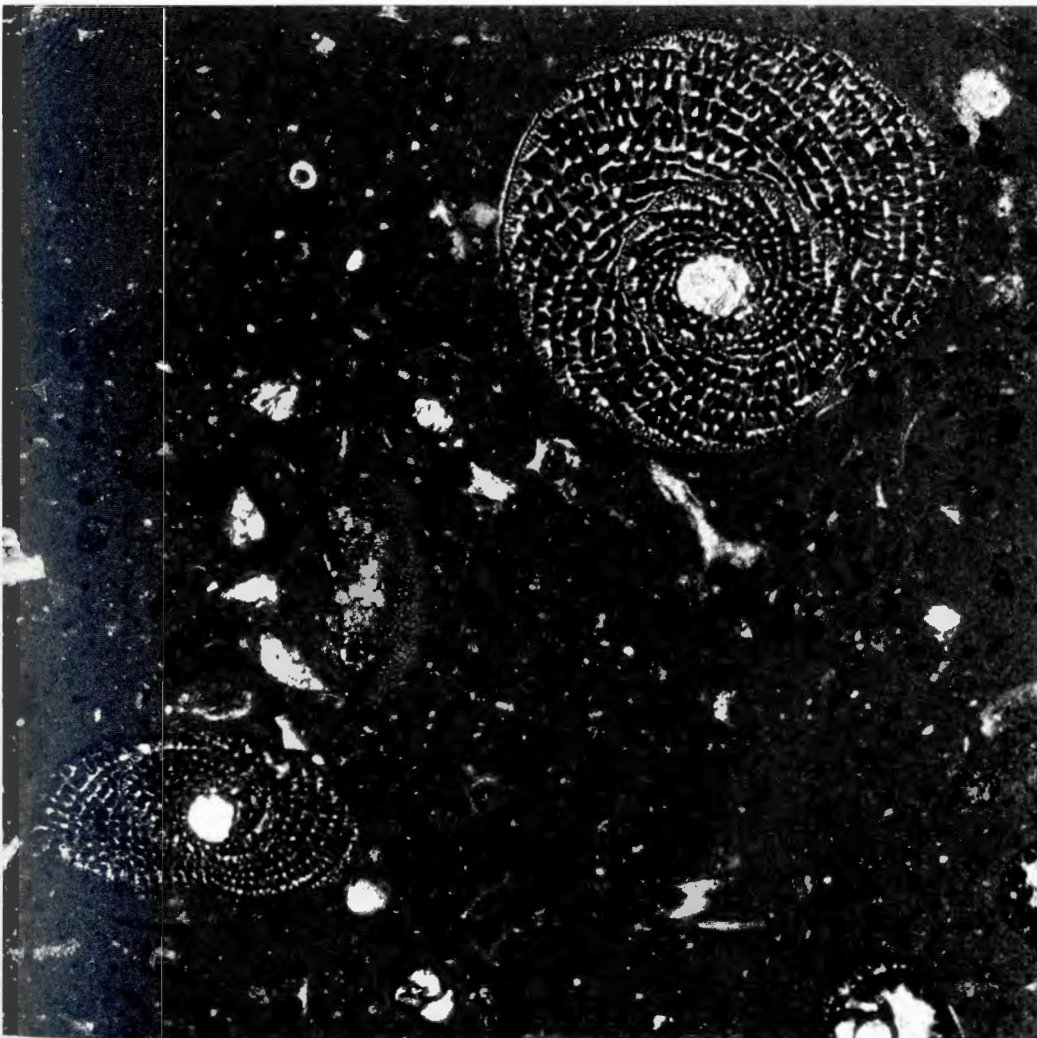




COLL.: BALDUZZI

Cladocoropsis mirabilis FELIX (X 8).
OXFORDIAN-KIMMERIDGIAN of Lattari
Mountains, Campania, Italy.

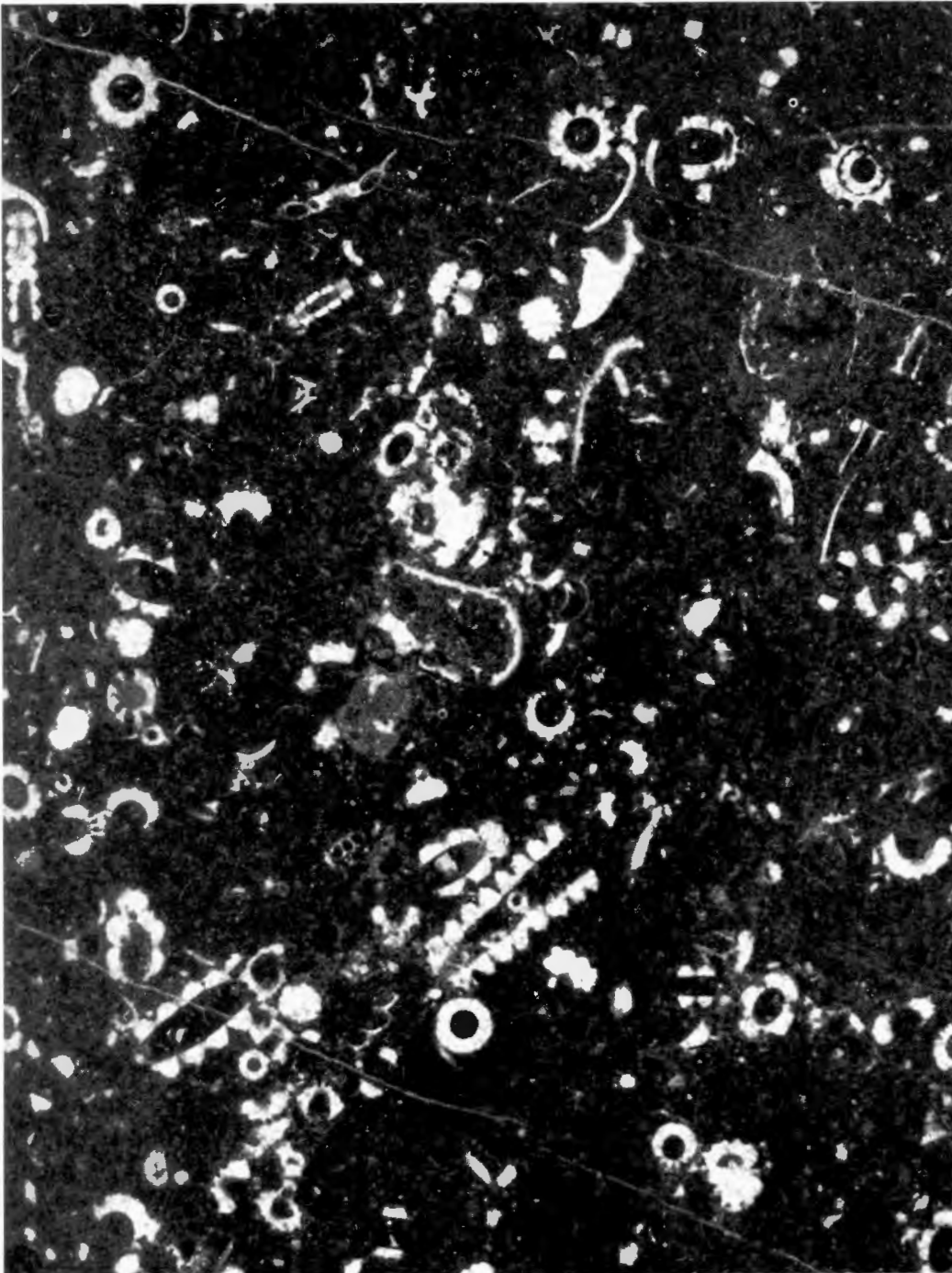
LIAS				DOGGER				MALM		
HETTANGIAN	Sinemurian	PLENSBACHIAN	TOARCAN	ALENIAN	BAUCCAN	BATHONIAN	CALLOVIAN	OXFORDIAN	KIMMERIDGIAN	TITHONIAN



Anchispirocyclina lusitanica (EGGER) (X 30).
TITHONIAN of Puerto.Cansado 1 well,
Morocco.

DOGGER		MALM		NEOCOMIAN						
BATHONIAN	CALLOVIAN	OXFORDIAN	KIMMERIDGIAN	TITHONIAN	BERRIASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN

In the Southern Tethys Domain this form is common
in North Africa.



Salpingoporella annulata CAROZZI (X 30).
NEOCOMIAN of Caserta, Campania, Italy.

DOGGER		MALM		NEOCOMIAN						
BATHONIAN	CALLOVIAN	OXFORDIAN	KIMMERIDGIAN	TITHONIAN	BERRIASIAN	VALANGINIAN	HAUTERVIAN	BARREMIAN	APTIAN	ALBIAN
---		---	---	-----						



Salpingoporella sellii (CRESCENTI) (X 45).
OXFORDIAN-KIMMERIDGIAN of Monte
Alpi, Basilicata, Italy.

LIAS				DOGGER				MALM		
HETTANGIAN	SNEWMURIAN	PUENSBACHIAN	TOARCAN	AALENIAN	BAJOCIAN	BATHONIAN	CALLOVIAN	OXFORDIAN	KIMMERIDGIAN	TITHONIAN



Ellipsactinia (X 5).
 OXFORDIAN-KIMMERIDGIAN of Cesarolo
 1 well, Venetia, Italy.

During the MALM these forms of hydrozoans take on
 remarkable significance as reef-building organisms.



Nerineids (*Phaneroptyxis*) (X 5) (left).
 KIMMERIDGIAN of Casoli 1 well, Abruzzo,
 Italy.



Nerineids (*Ptygmatis*) (X 15) (right).
 KIMMERIDGIAN of Monte Sacro, Apulia,
 Italy.

Nerineids are typical gastropods of the JURASSIC
 and CRETACEOUS.



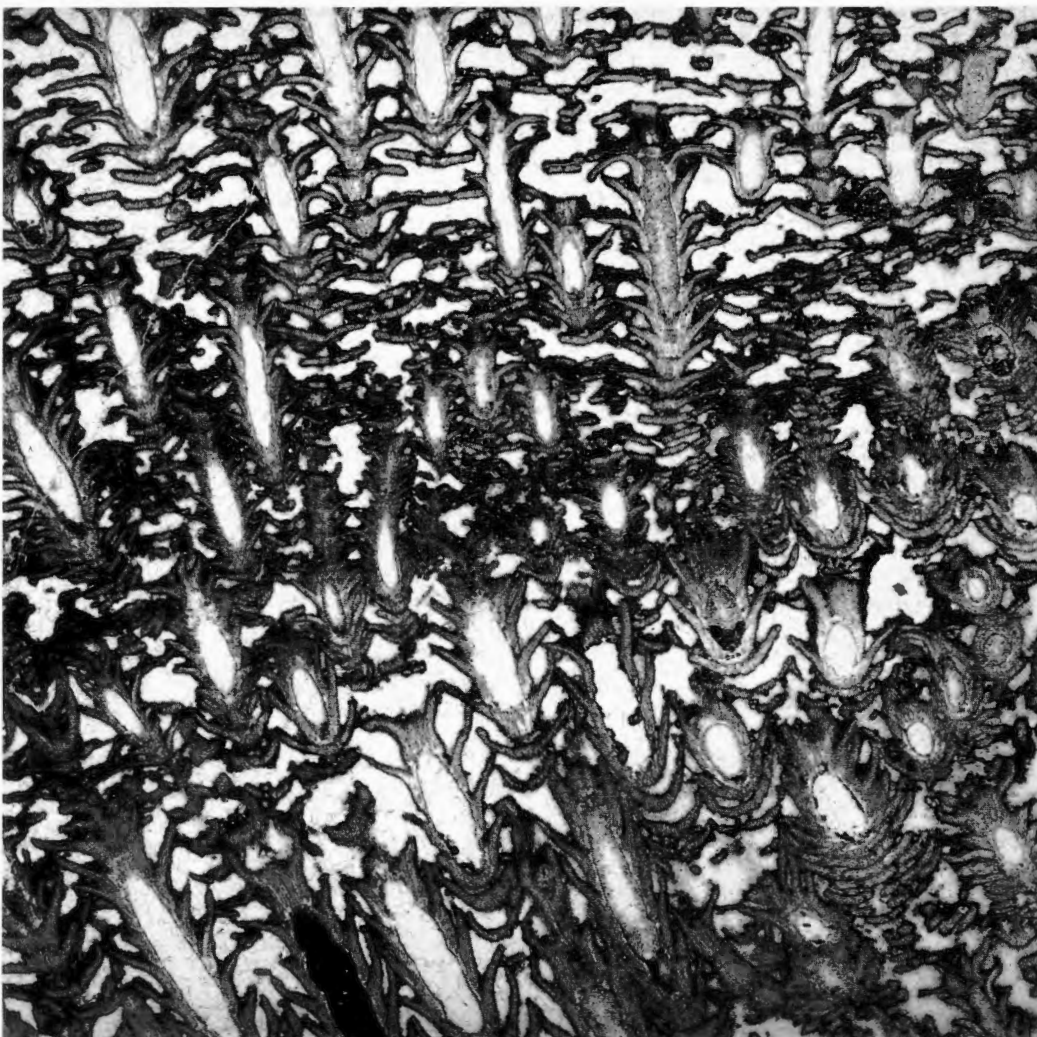
Campbelliella striata (CAROZZI) (X 15).
Detail (X 30).
TITHONIAN of Nola, Campania, Italy.

LIAS				DOGGER				MALM		
HETTANGIAN	Sinemurian	PLEINSACHIAN	TOARCIC	Aalenian	BALUCHIAN	BATHONIAN	CALLOVIAN	OXFORDIAN	KIMMERIDGIAN	TITHONIAN



Neoteutloporella socialis (PRATURLON) (X 7).
TITHONIAN of Monte Corno, Abruzzo, Italy.

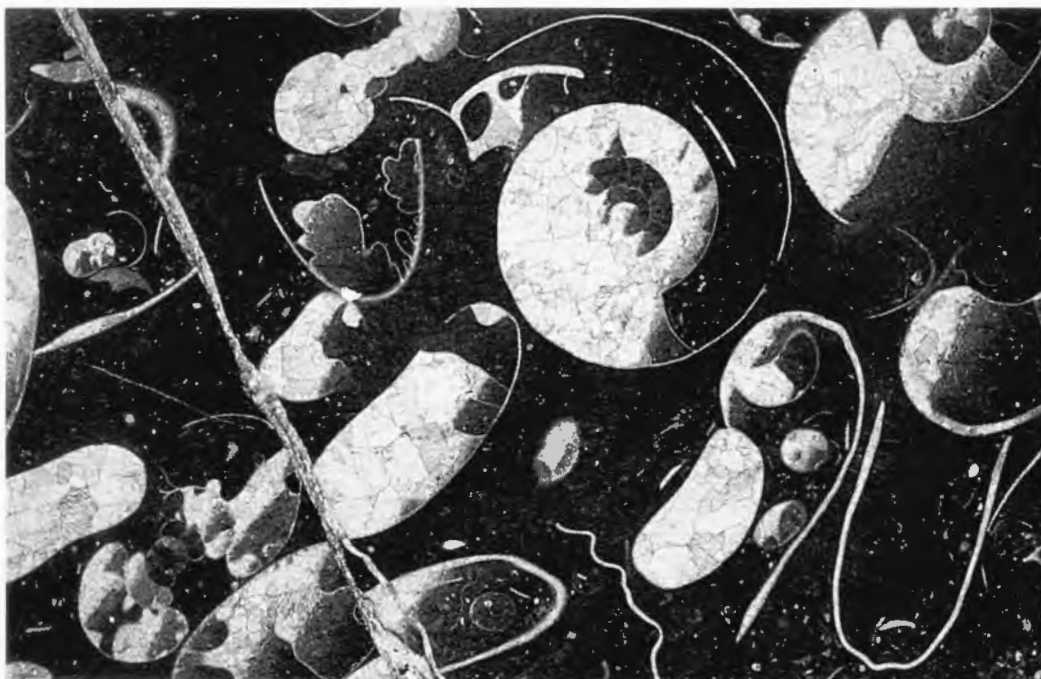
LIAS				DOGGER				MALM		
HETTANGIAN	Sinemurian	PLEINSACHIAN	TOARCIC	Aalenian	BALUCHIAN	BATHONIAN	CALLOVIAN	OXFORDIAN	KIMMERIDGIAN	TITHONIAN



Opposite page
Clypeina jurassica FAVRE (X 25).
UPPER KIMMERIDGIAN-TITHONIAN of
Cellina Valley, Friuli, Italy.

LIAS				DOGGER				MALM		
HETTANGIAN	Sinemurian	PLEINSACHIAN	TOARCIC	Aalenian	BALUCHIAN	BATHONIAN	CALLOVIAN	OXFORDIAN	KIMMERIDGIAN	TITHONIAN





Ammonites (X 9).
LIAS of Zandobbio, Lombardy, Italy.

Facies with cephalopods are present from the PALEOZOIC but they take on particular significance during the JURASSIC with ammonites.



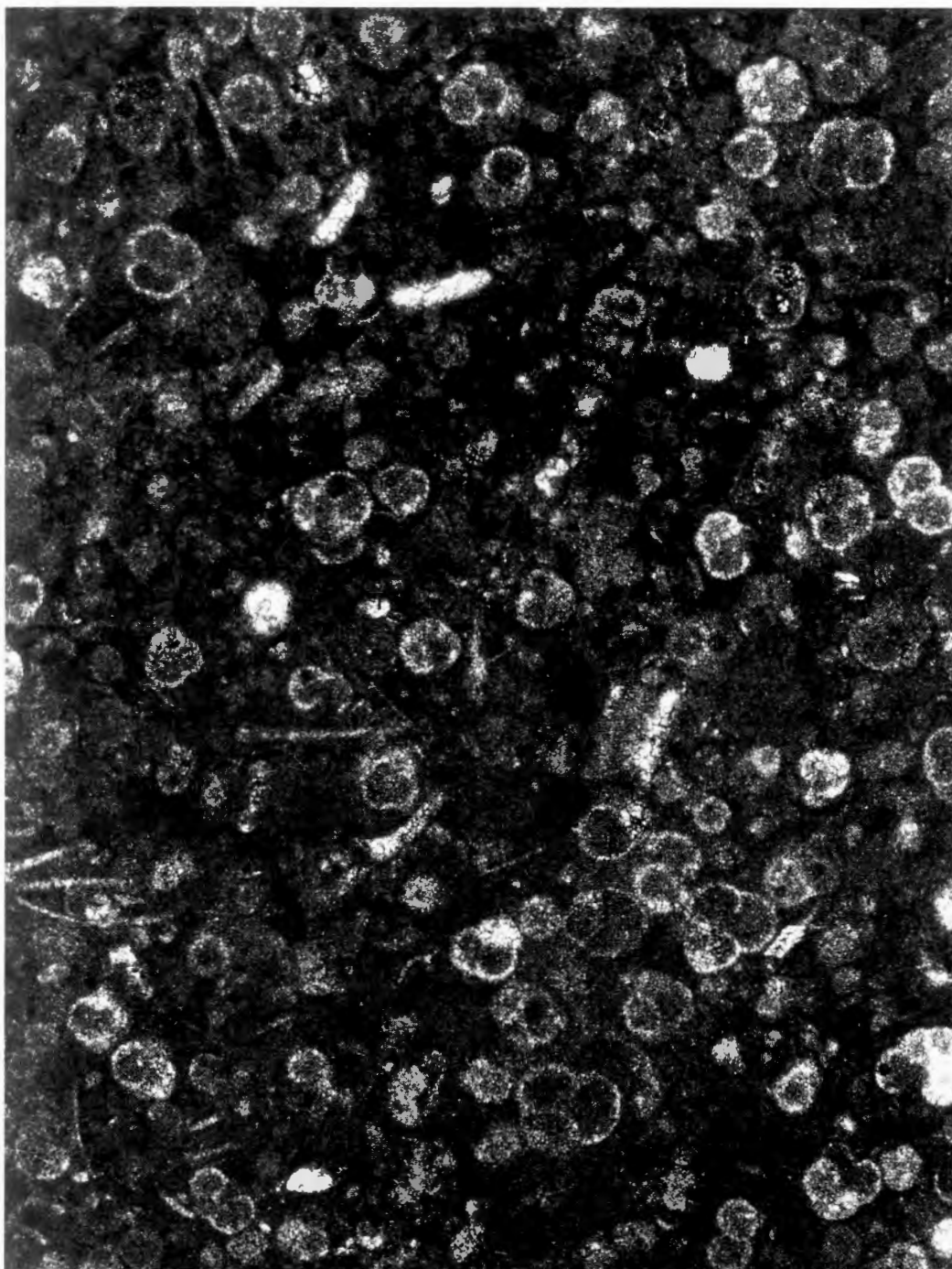
Aptychus and radiolarians (X 30).
OXFORDIAN-KIMMERIDGIAN of David 1
well, Adriatic Sea.

Aptychi, calcareous opercula of ammonites, are particularly common from the JURASSIC to the EARLY CRETACEOUS.



Pelagic pelecypods and radiolarians
(X 20).
TOARCIAN-AALENIAN of Valdorbia,
Umbria, Italy.

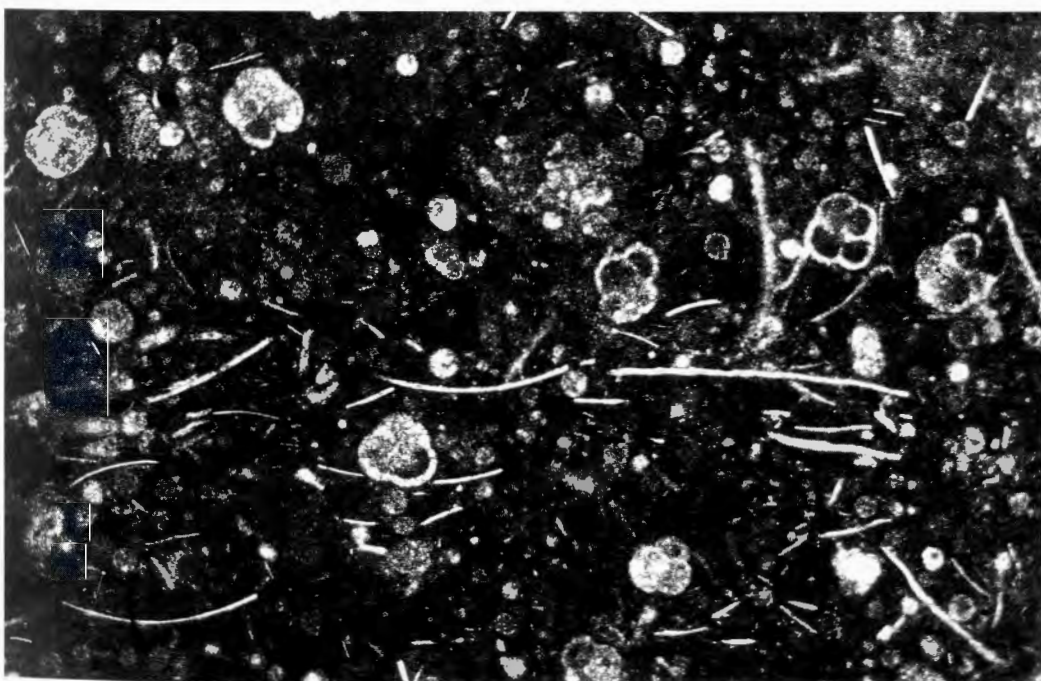
Pelagic pelecypods are common in basinal sequences of the JURASSIC.



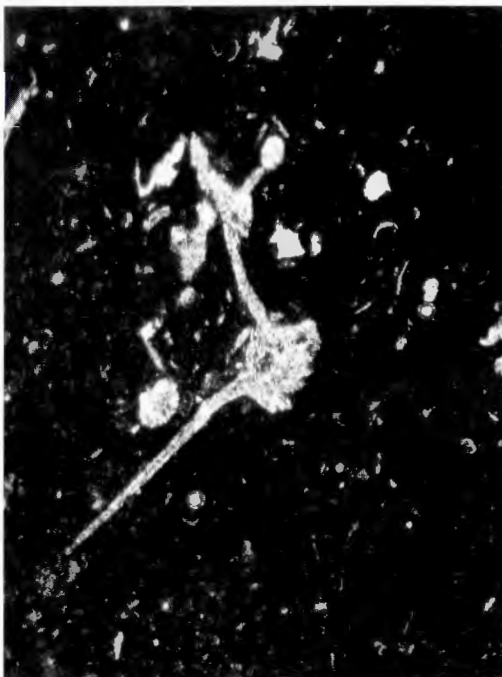
Globuligerina (X 50).
CALLOVIAN-OXFORDIAN of Gambettola 1
well, Romagna, Italy.

LIAS				DOGGER				MALM		
HETTANGIAN	Sinemurian	PLENSBACHIAN	TOARCAN	Aalenian	Bajocian	Bathonian	Callovian	Oxfordian	Kimmeridgian	Tithonian

These are the oldest planktonic foraminifers present
in basinal sequence from the MIDDLE JURASSIC.
"Protoglobigerina" is an informal name usually
given to these forms.



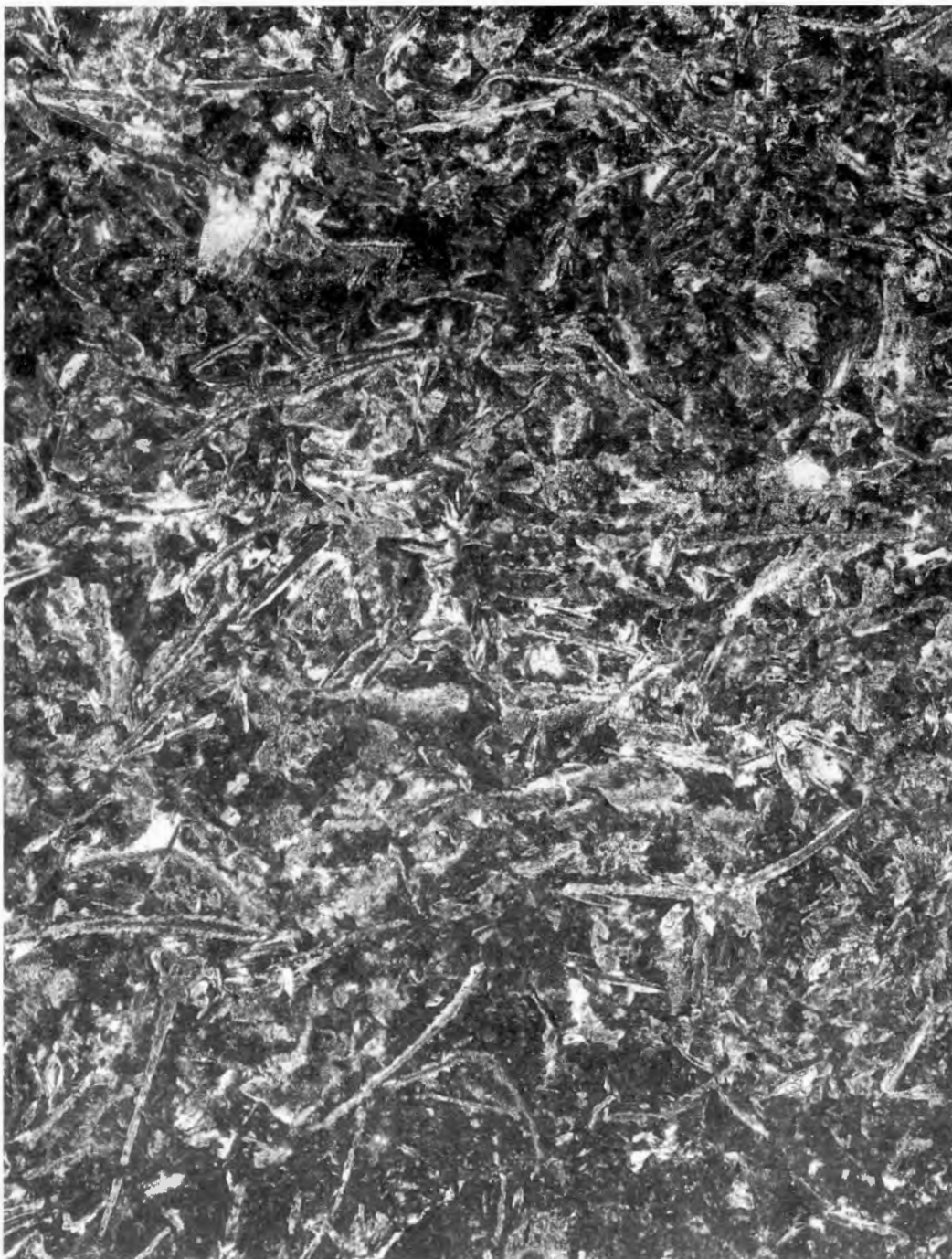
Globuligerina. Pelagic pelecypods and
radiolarians are present (X 40).
CALLOVIAN-OXFORDIAN of Gola della
Rossa, Marche, Italy.



Saccocoma (X 70) (left).
UPPERMOST KIMMERIDGIAN-LOWER
TITHONIAN of Kharrouba 1 well,
Maknassi, Tunisia.

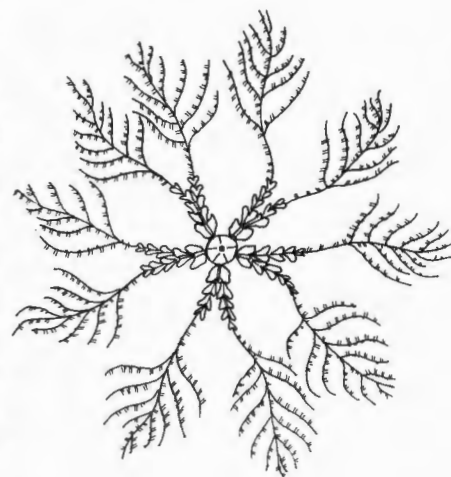
Saccocoma (X 55) (right).
LOWER TITHONIAN of Valdorbis, Umbria,
Italy.

LIAS				DOGGER				MALM		
HETTANGIAN	Sinemurian	PLeMSBACHIAN	TOARCAN	Aalenian	BALCOAN	BATHONIAN	CALLOVIAN	OXFORDIAN	KIMMERIDGIAN	TITHONIAN

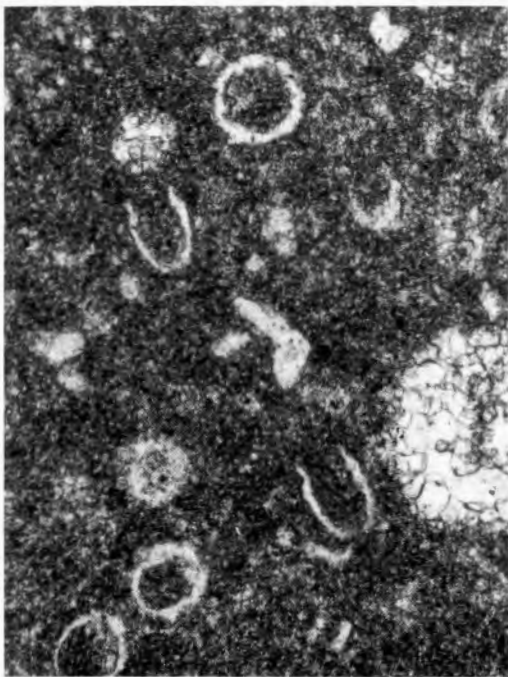


Saccocoma (X 60).
LOWER TITHONIAN of Casaglia 1 well,
Emilia, Italy.

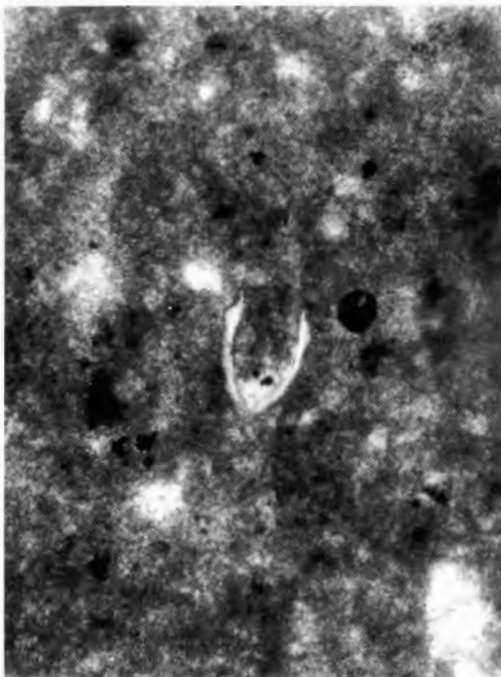
These are the secundibrachial plates of *Saccocoma* which is a pelagic crinoid. *Saccocoma* takes on remarkable importance in biohorizons of LATEST KIMMERIDGIAN-EARLY TITHONIAN age.



Detail of *Saccocoma* (X 3) with secundibrachial
plates (X 40).



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Crassicollaria (X 180) (left).
UPPER TITHONIAN of Ferrara del Baldo,
Venetia, Italy.

Crassicollaria (X 240) (right).
UPPER TITHONIAN of Kharrouba 1 well,
Maknassi, Tunisia.
Detail (X 280).

DOGGER		MALM			NEOCOMIAN					
BATHONIAN	CALLOVIAN	OXFORDIAN	KIMMERIDGIAN	TITHONIAN	BERRIASIAN	VALANGINIAN	HAUTERVIAN	BARREMIAN	APTIAN	ALBIAN



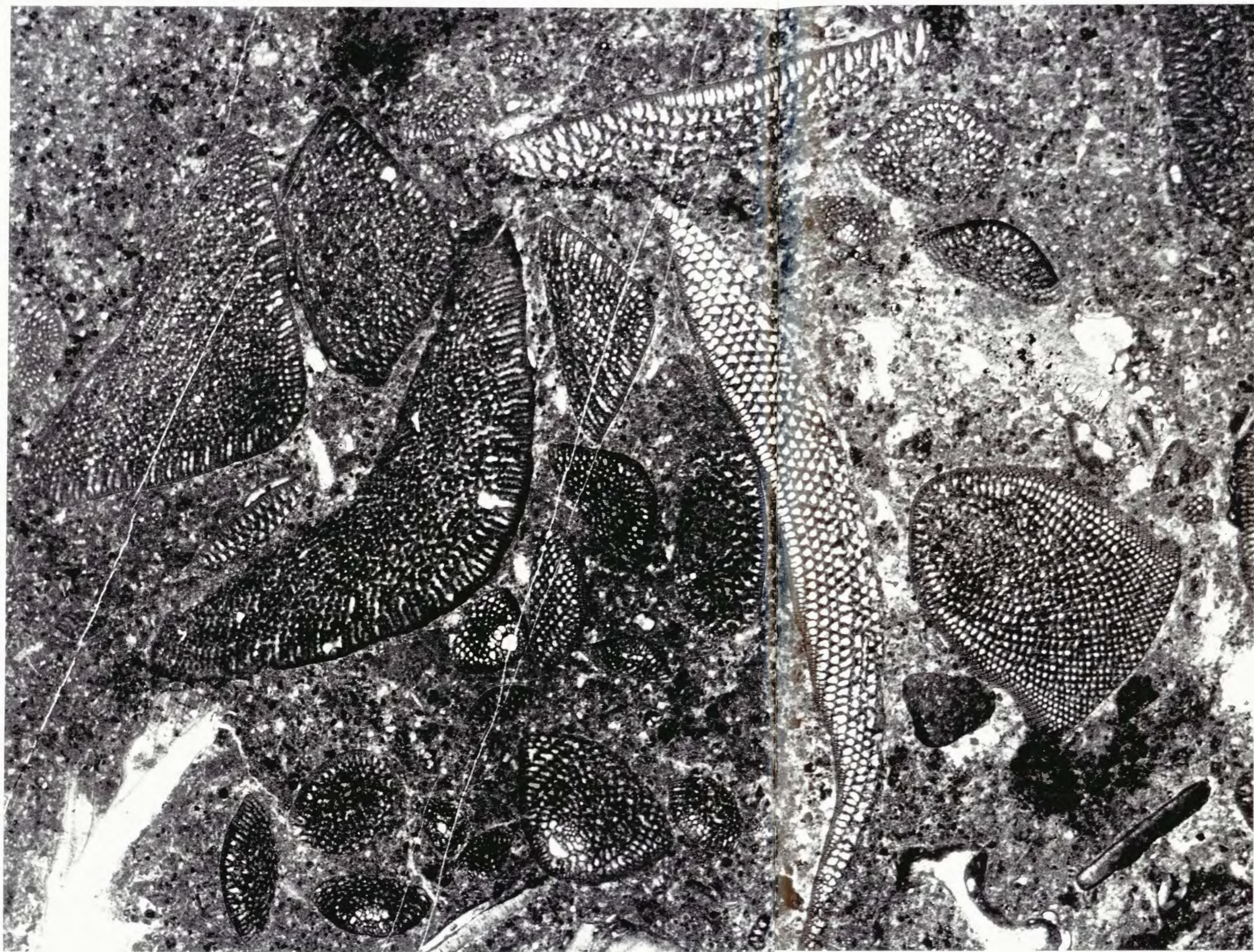
Crassicollaria is also present in the EARLY
BERRIASIAN but generally it identifies the LATE
TITHONIAN.



Calpionella alpina LORENZ (X 50).
UPPER TITHONIAN of Grezzana, Venetia,
Italy.
Detail (X 100) from UPPER TITHONIAN of
Consandolo 1 well, Romagna, Italy.

DOGGER		MALM			NEOCOMIAN					
BATHONIAN	CALLOVIAN	OXFORDIAN	KIMMERIDGIAN	TITHONIAN	BERRIASIAN	VALANGINIAN	HAUTERVIAN	BARREMIAN	APTIAN	ALBIAN





CRETACEOUS

EPOCHS & AGES					
Agip		Ma	Haq et Al. 1987 (modified)		Ma
LATE	MAASTRICHTIAN	66,4	LATE	MAASTRICHTIAN	66,5
	CAMPANIAN	76		CAMPANIAN	74
	SANTONIAN	84		SANTONIAN	84
	CONIACIAN	88		CONIACIAN	88
	TURONIAN	90		TURONIAN	89
	CENOMANIAN	93		CENOMANIAN	92
EARLY	ALBIAN	100	EARLY	ALBIAN	96
	APTIAN	108		APTIAN	108
	BARREMIAN	115		BARREMIAN	113
	HAUTERIVIAN	122		HAUTERIVIAN	116,5
	VALANGINIAN	126		VALANGINIAN	121
	BERRIASIAN	131		BERR.	128
		136		RYAZANIAN	131



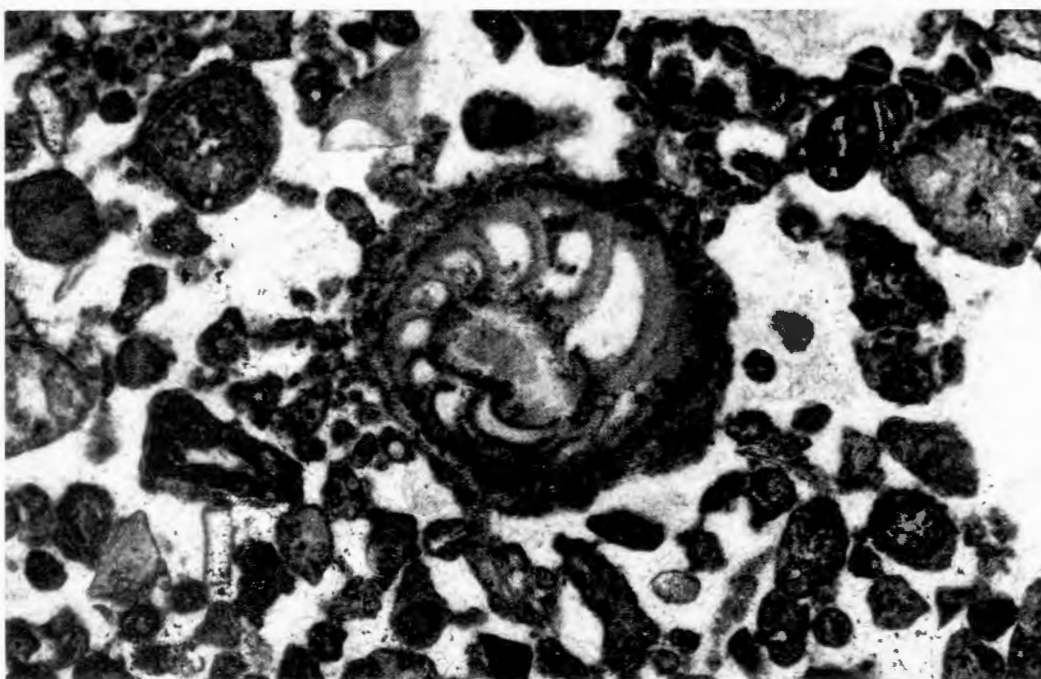
"*Conicospirillina*" *basiliensis* MOHLER
(X 40).
BERRIASIAN of Cesarolo 1 well, Venetia,
Italy.

DOGGER		MALM			NEOCOMIAN						
BATHONIAN	CALLOVIAN	OXFORDIAN	KIMMERIDGIAN	TITHONIAN	BERRIASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN			

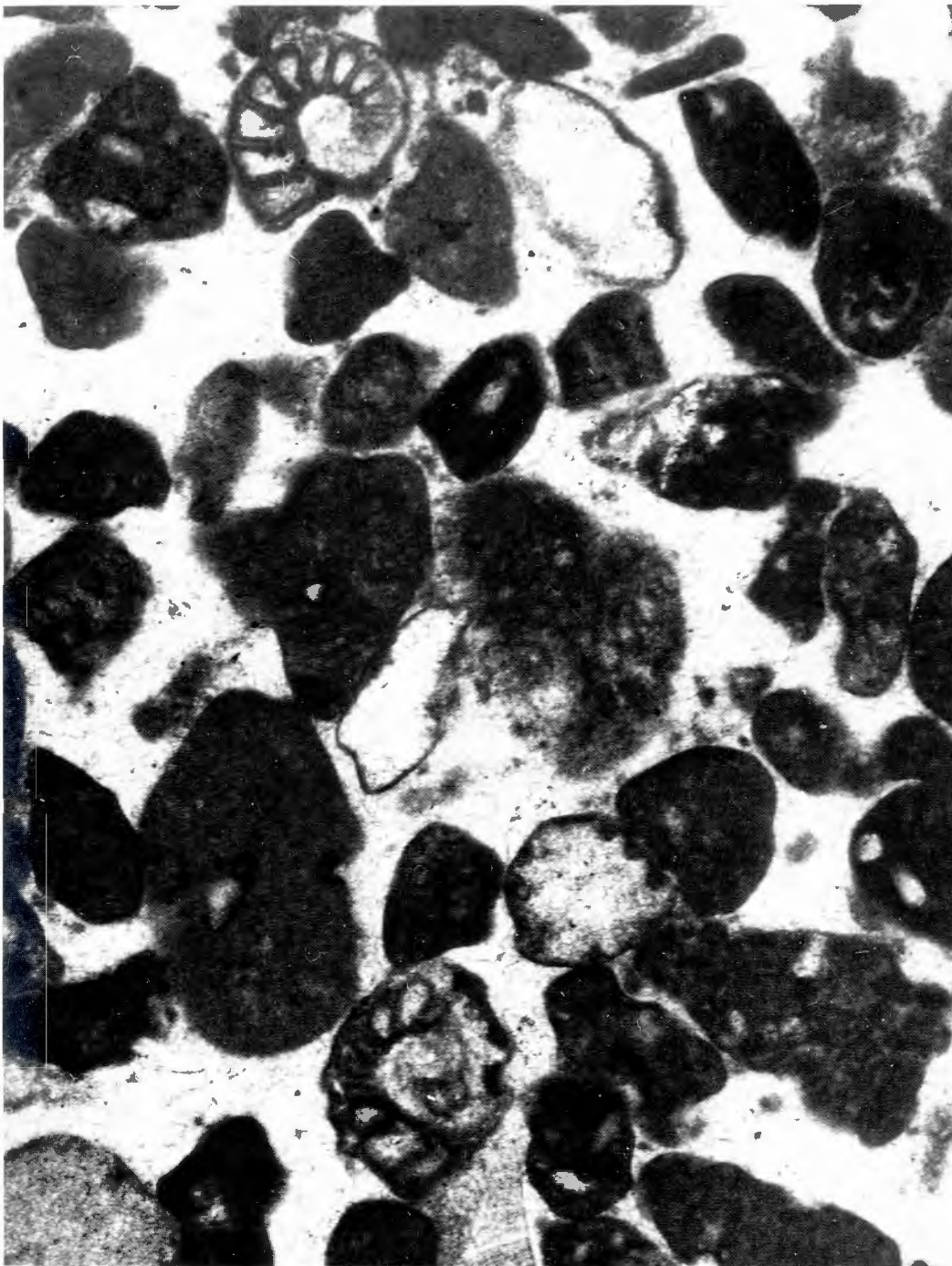
This foraminifer, present from the BATHONIAN, is important in defining sediments not younger than the VALANGINIAN.



"*Conicospirillina*" *basiliensis* MOHLER
(X 60).
BERRIASIAN of Cesarolo 1 well, Venetia,
Italy.



"*Conicospirillina*" *basiliensis* MOHLER
(X 35).
BERRIASIAN of Cesarolo 1 well, Venetia,
Italy.

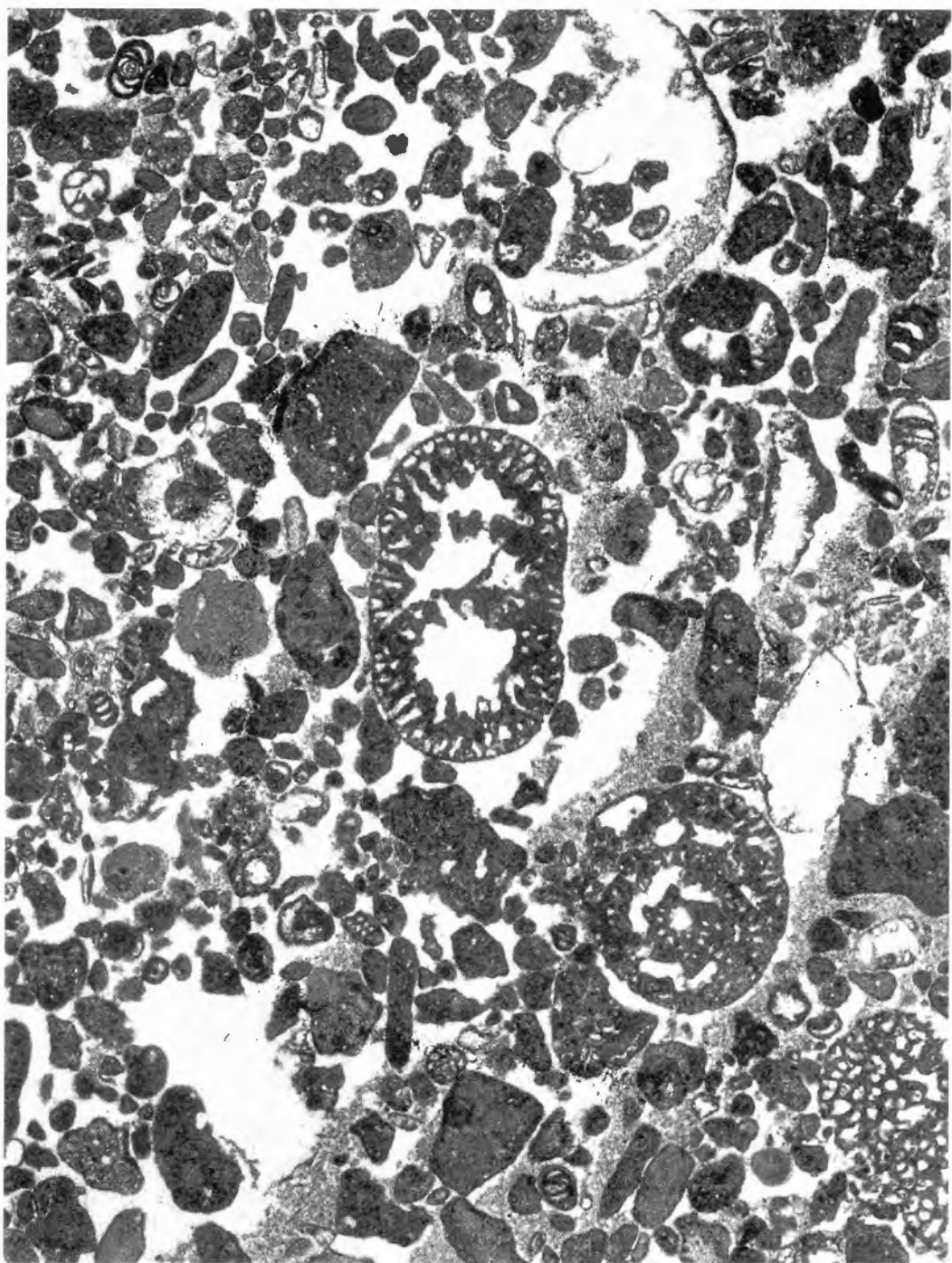


Protopenneroplis trochangulata
SEPTFONTAINE and *Trocholina* (X 50).
BERRIASIAN of Anna 1 well, Adriatic Sea.



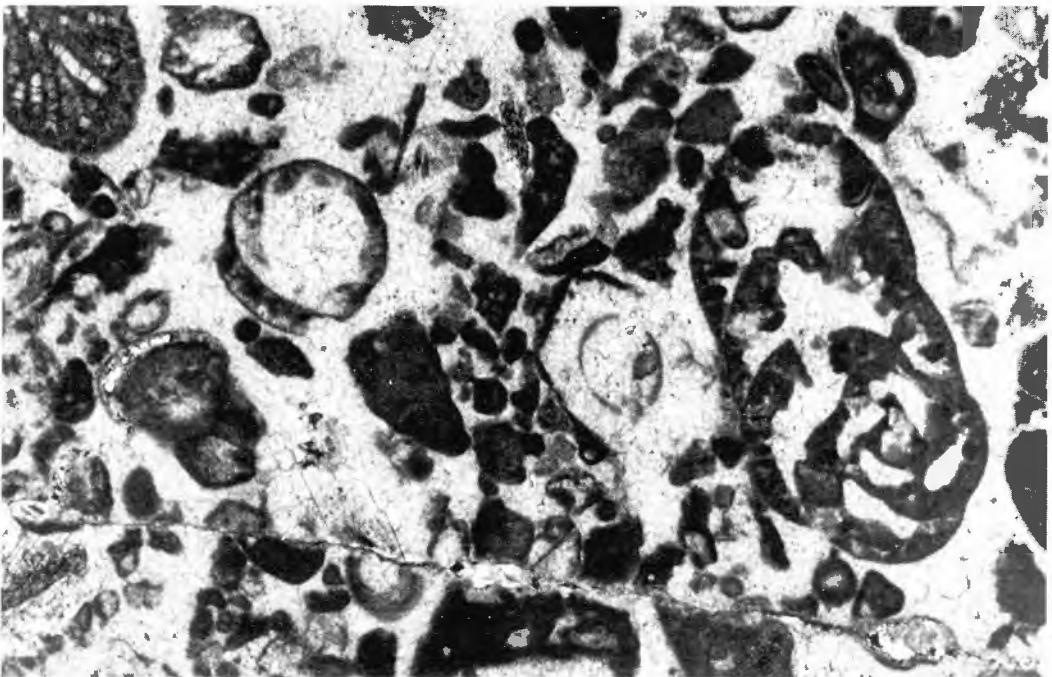
Protopenneroplis trochangulata
SEPTFONTAINE (X 60).
BERRIASIAN of Cesarolo 1 well, Venetia,
Italy.

DOGGER		MALM			NEOCOMIAN					
BATHONIAN	CALLOVIAN	OXFORDIAN	KIMMERIDGIAN	TITHONIAN	BERRIASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN



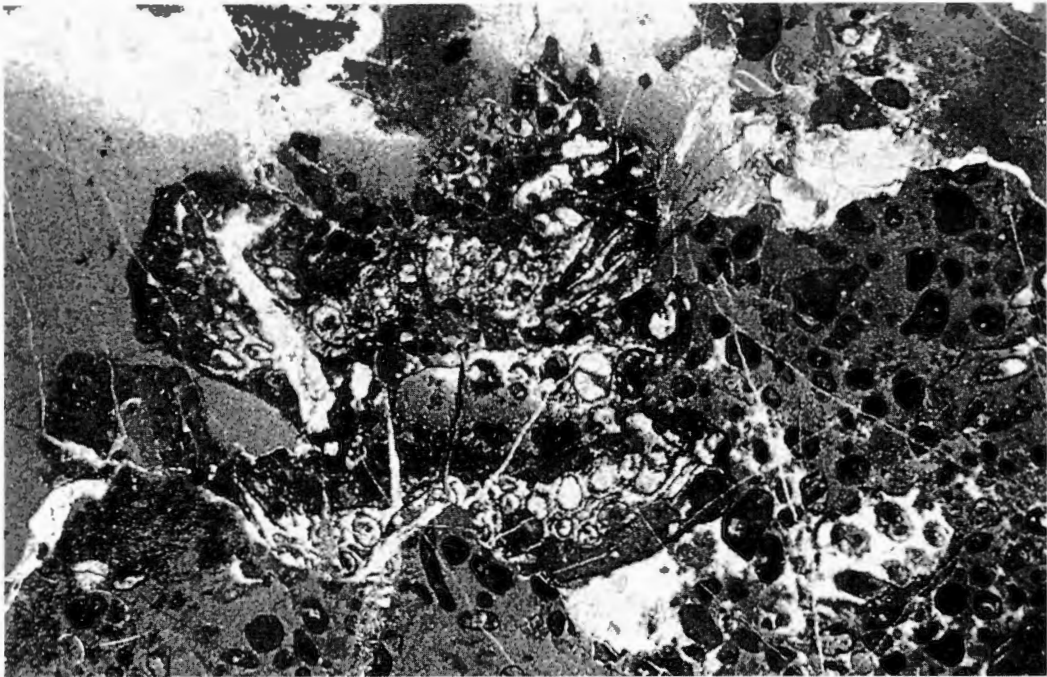
Pseudocyclammia lituus (YOKOYAMA).
Textulariidae, *Trocholina* and algae are present (X 10).
BERRIASIAN of Cesarolo 1 well, Venetia, Italy.

DOGGER		MALM			NEOCOMIAN					
BATHONIAN	CALLOVIAN	OXFORDIAN	KIMMERIDGIAN	TITHONIAN	BERRIASIAN	VALANGINIAN	HAUTERVIAN			
								BARREMIAN	APTIAN	ALBIAN



Everticyclammia hedbergi (MAYNC).
Trocholina and corals are present (X 20).
NEOCOMIAN of Gargano, Apulia, Italy.

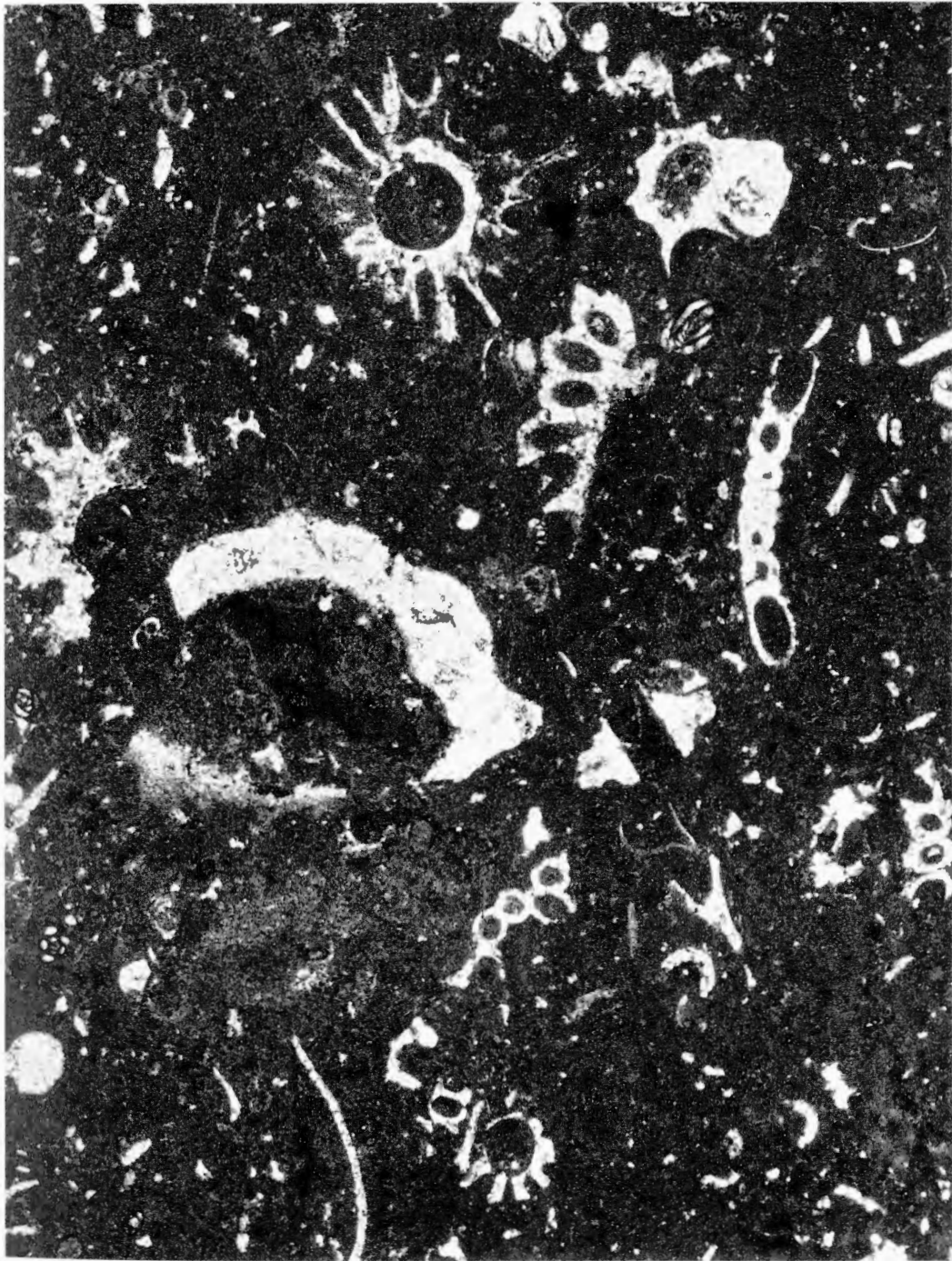
NEOCOMIAN							SENONIAN			
BERRIASIAN	VALANGINIAN	HAUTERVIAN					BARREMIAN	APTIAN	ALBIAN	CENOMANIAN
							TURONIAN	CONIACIAN	SANTONIAN	CAMPANIAN
										MAASTRICHTIAN



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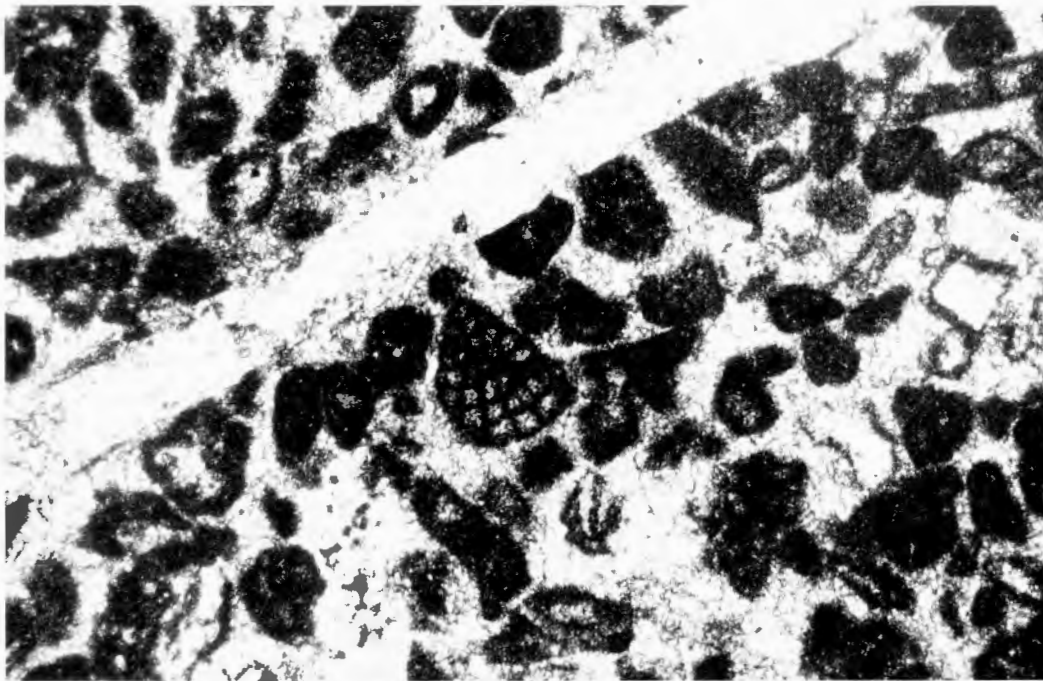
Triploporella? neocomiensis RADOIČIĆ
(X 25).
BERRIASIAN of Caserta, Campania, Italy.

NEOCOMIAN			SENONIAN							
BERRIASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN	CAMPANIAN



Actinoporella podolica (ALTH) (X 20).
NEOCOMIAN of Cupello 19 well, Abruzzo,
Italy.

NEOCOMIAN			SENONIAN							
BERRIASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN	CAMPANIAN

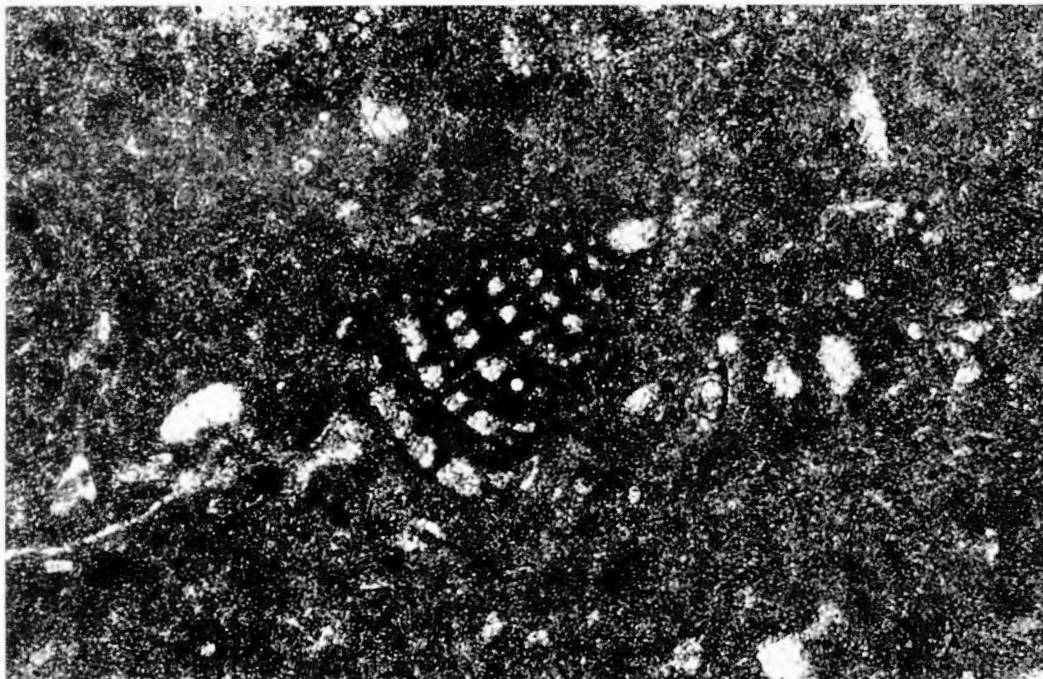


COLL.: VENTURINI

Pseudotextulariella salevensis CHAROLLAIS, BRÖNNIMANN & ZANINETTI (X 70).
NEOCOMIAN of Judrio Valley, Friuli, Italy.

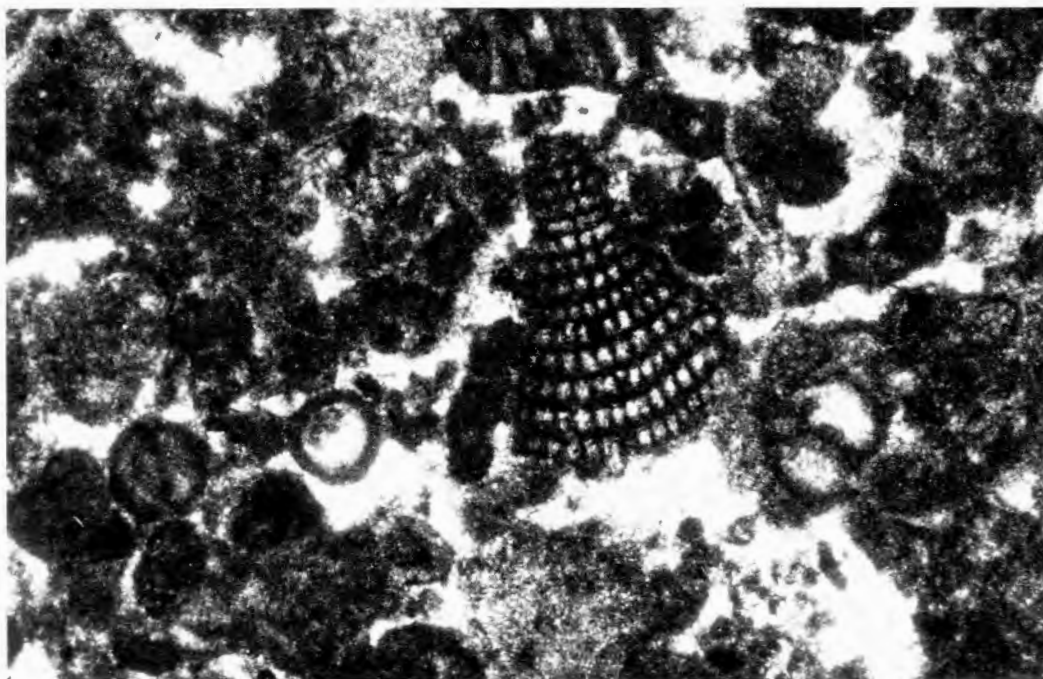
NEOCOMIAN							SENONIAN				
BERRIASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN	CAMPANIAN	MAASTRICHTIAN

All these foraminifers are typical of the EARLY CRETACEOUS.



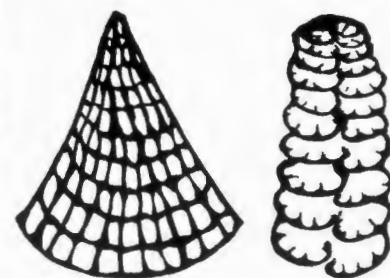
Cuneolina laurentii SARTONI & CRESCENTI (X 90).
LOWER APTIAN of Benevento 2 well, Campania, Italy.
Detail (X 70).

NEOCOMIAN							SENONIAN				
BERRIASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN	CAMPANIAN	MAASTRICHTIAN



Cuneolina camposaurii SARTONI & CRESCENTI (X 90).
NEOCOMIAN of Caserta, Campania, Italy.
Detail (X 70).

NEOCOMIAN							SENONIAN				
BERRIASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN	CAMPANIAN	MAASTRICHTIAN



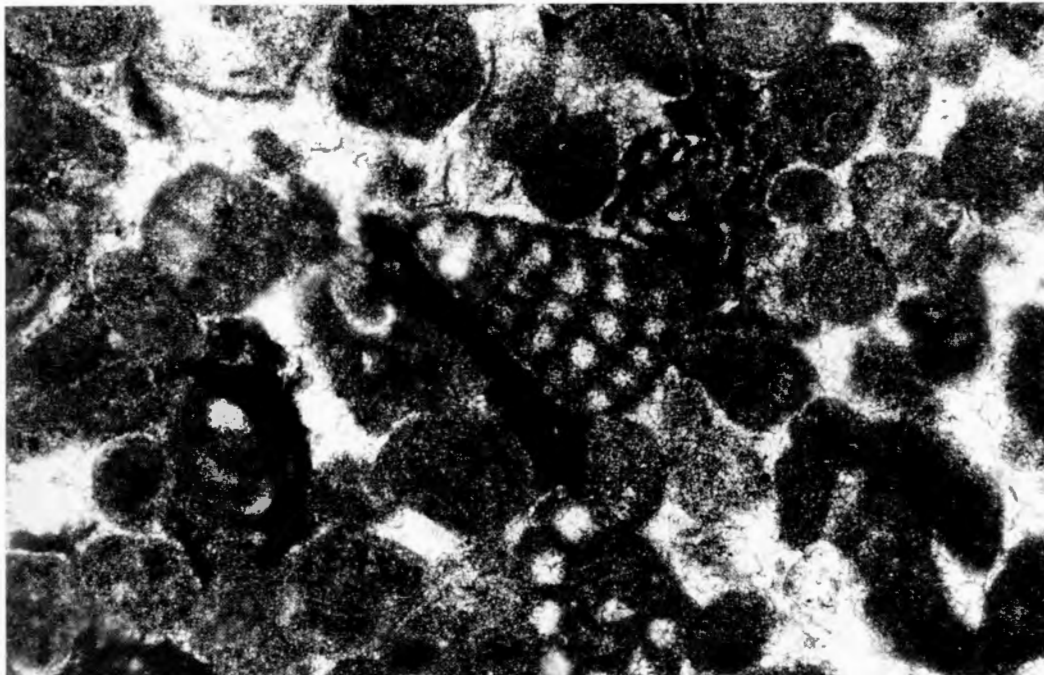
COLL.: DE CASTRO, INST. OF PALEONT. UNIV. OF NAPLES



COLL.: DE CASTRO, INST. OF PALEONT. UNIV. OF NAPLES

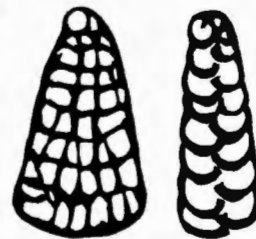
Pseudotextulariella? scarsellai (DE CASTRO)
(X 70).
UPPER BARREMIAN-LOWER APTIAN of
Capua, Campania, Italy.

NEOCOMIAN						SENONIAN					
BERRIASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN	CAMPANIAN	MAASTRICHTIAN



Vercorsella arenata ARNAUD-VANNEAU
(X 90).
APTIAN of Cupello 19 well, Abruzzo, Italy.
Detail (X 80).

NEOCOMIAN						SENONIAN					
BERRIASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN	CAMPANIAN	MAASTRICHTIAN



Sabaudia minuta (HOFKER) (X 120) (left).
ALBIAN of Cornappo Valley, Friuli, Italy.

NEOCOMIAN						SENONIAN					
BERRIASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN	CAMPANIAN	MAASTRICHTIAN



Sabaudia capitata ARNAUD-VANNEAU
(X 100) (right).
ALBIAN of Cornappo Valley, Friuli, Italy.

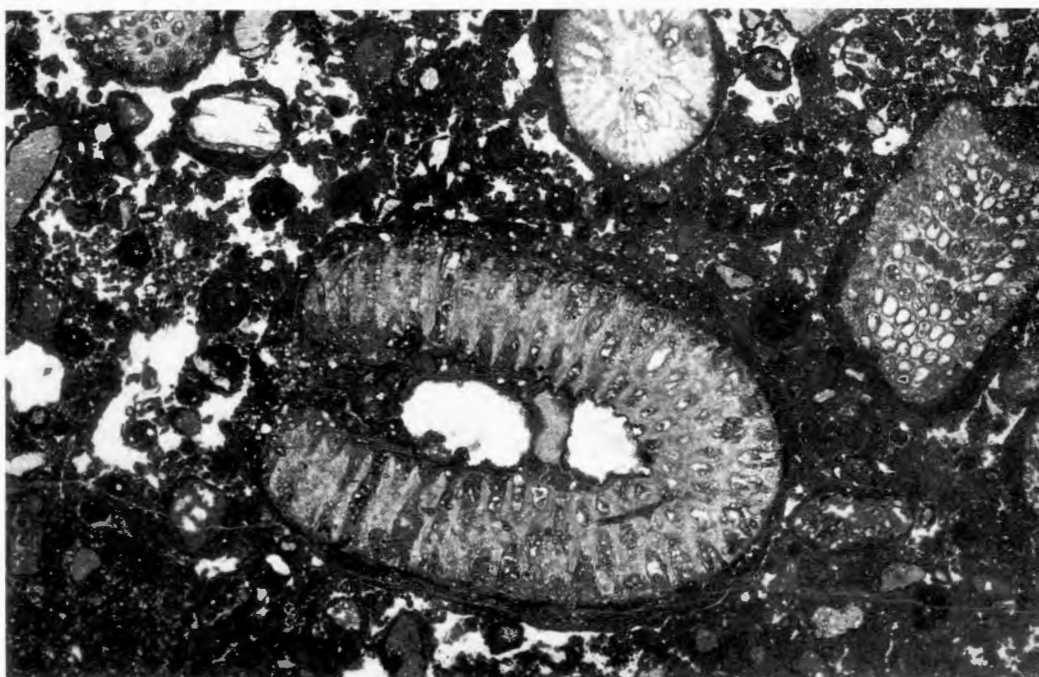
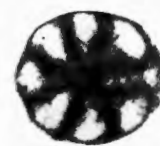
NEOCOMIAN						SENONIAN					
BERRIASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN	CAMPANIAN	MAASTRICHTIAN



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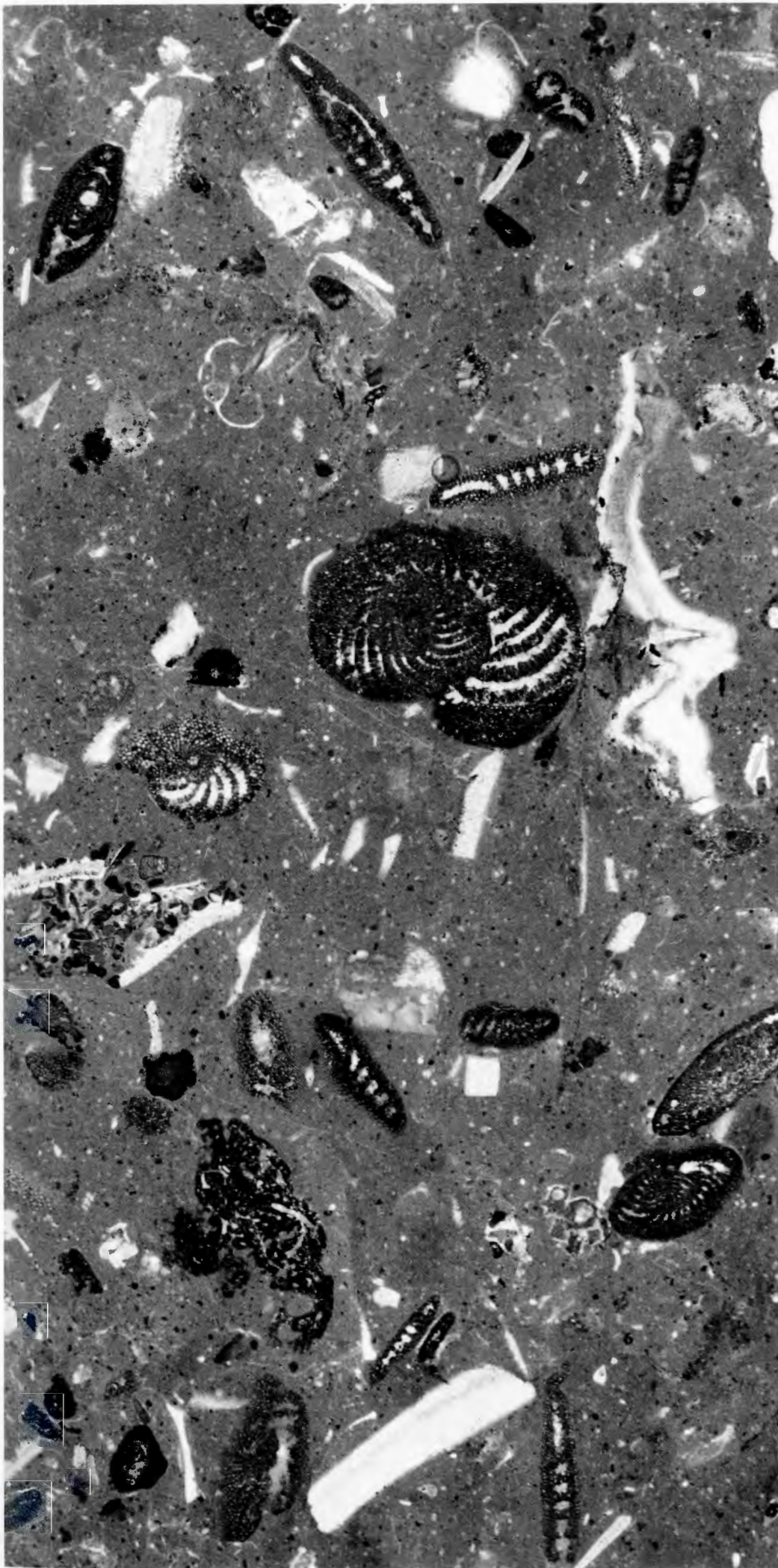
Orbitolinopsis capuensis (DE CASTRO)
(X 60).
HAUTERIVIAN-LOWER BARREMIAN of
Padula, Campania, Italy.
Detail (X 80).

NEOCOMIAN				SENONIAN							
BERRIASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN	CAMPANIAN	MAASTRICHTIAN



Triploporella praturioni BARATTOLO (X 10).
HAUTERIVIAN of S. Dona' di Piave,
Venetia, Italy.

NEOCOMIAN				SENONIAN							
BERRIASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN	CAMPANIAN	MAASTRICHTIAN

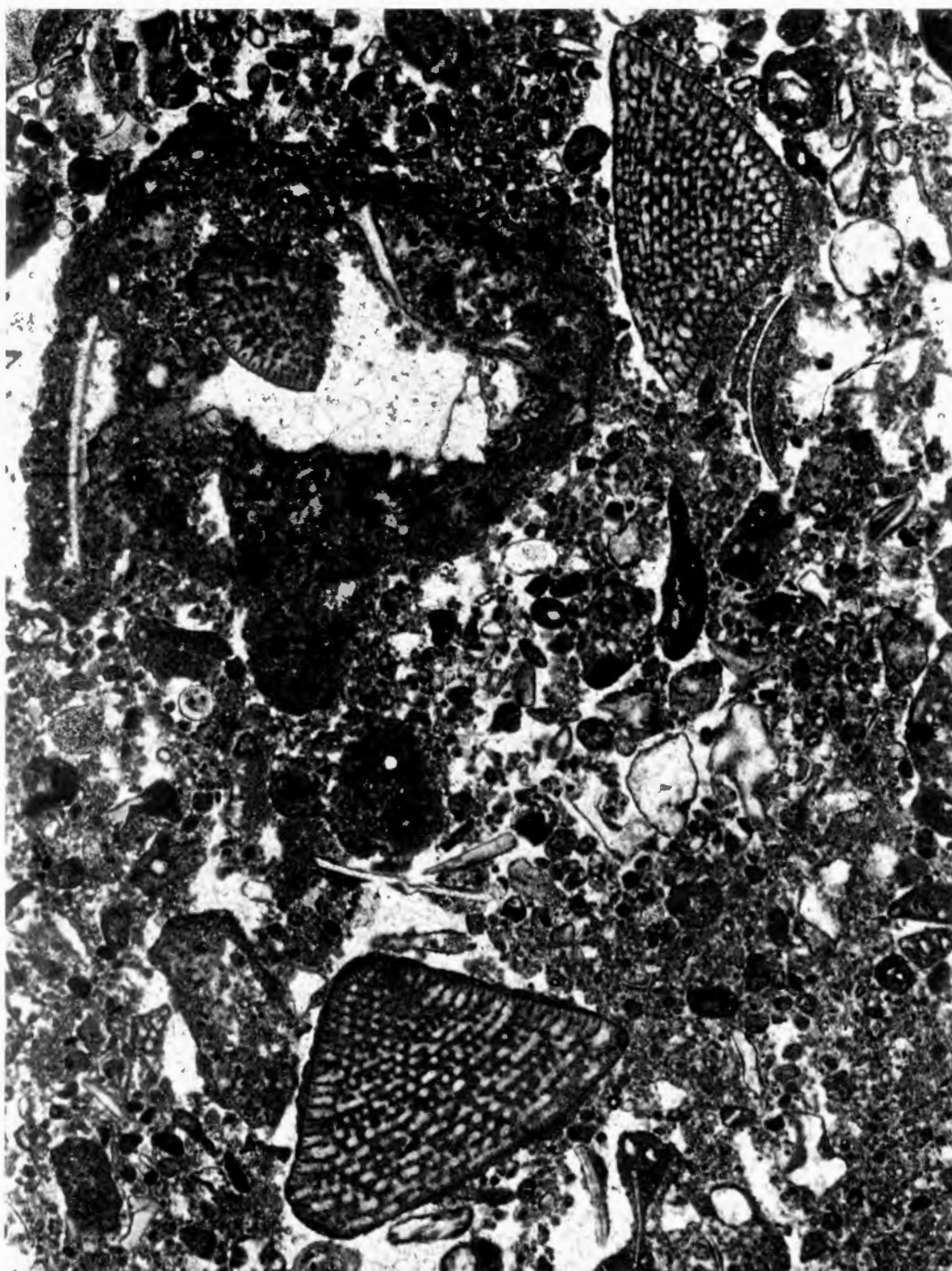


Choffatella decipiens SCHLUMBERGER
(X 20). Detail (X 40).
UPPER BARREMIAN-LOWER APTIAN of
Sara 1 well, P.D.R. of Yemen.

NEOCOMIAN				SENONIAN							
BERRIASIAN	VALANGIAN	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN	CAMPANIAN	MAASTRICHTIAN

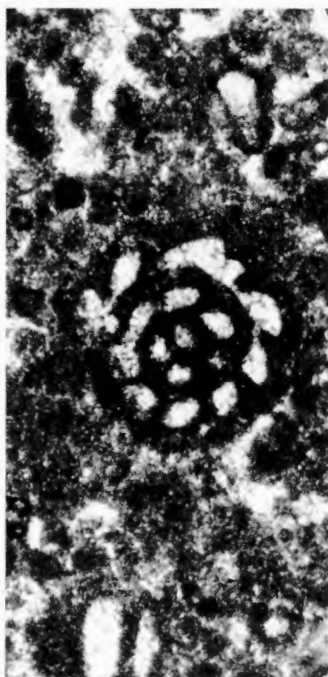
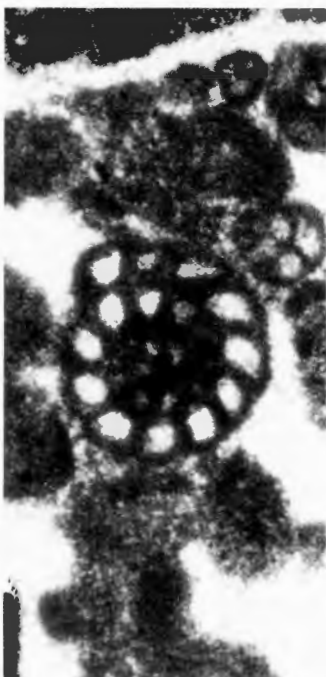
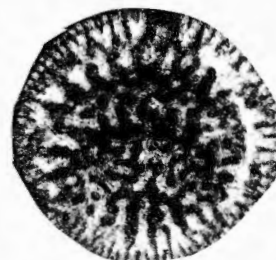
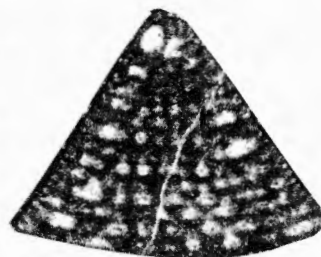
In the Southern Tethys Domain this foraminifer is
mainly present in North Africa and in the Arabian
Peninsula.





Paleodictyoconus arabicus (HENSON) (X 20).
UPPER BARREMIAN of Monte S. Angelo,
Apulia, Italy.
Detail (X 30) from UPPER BARREMIAN of
Ras Sharwayn, P.D.R. of Yemen.

NEOCOMIAN				SENONIAN					
BERRIASIAN	VALANGINIAN	HAUTERVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	MAASTRICHTIAN
			■						

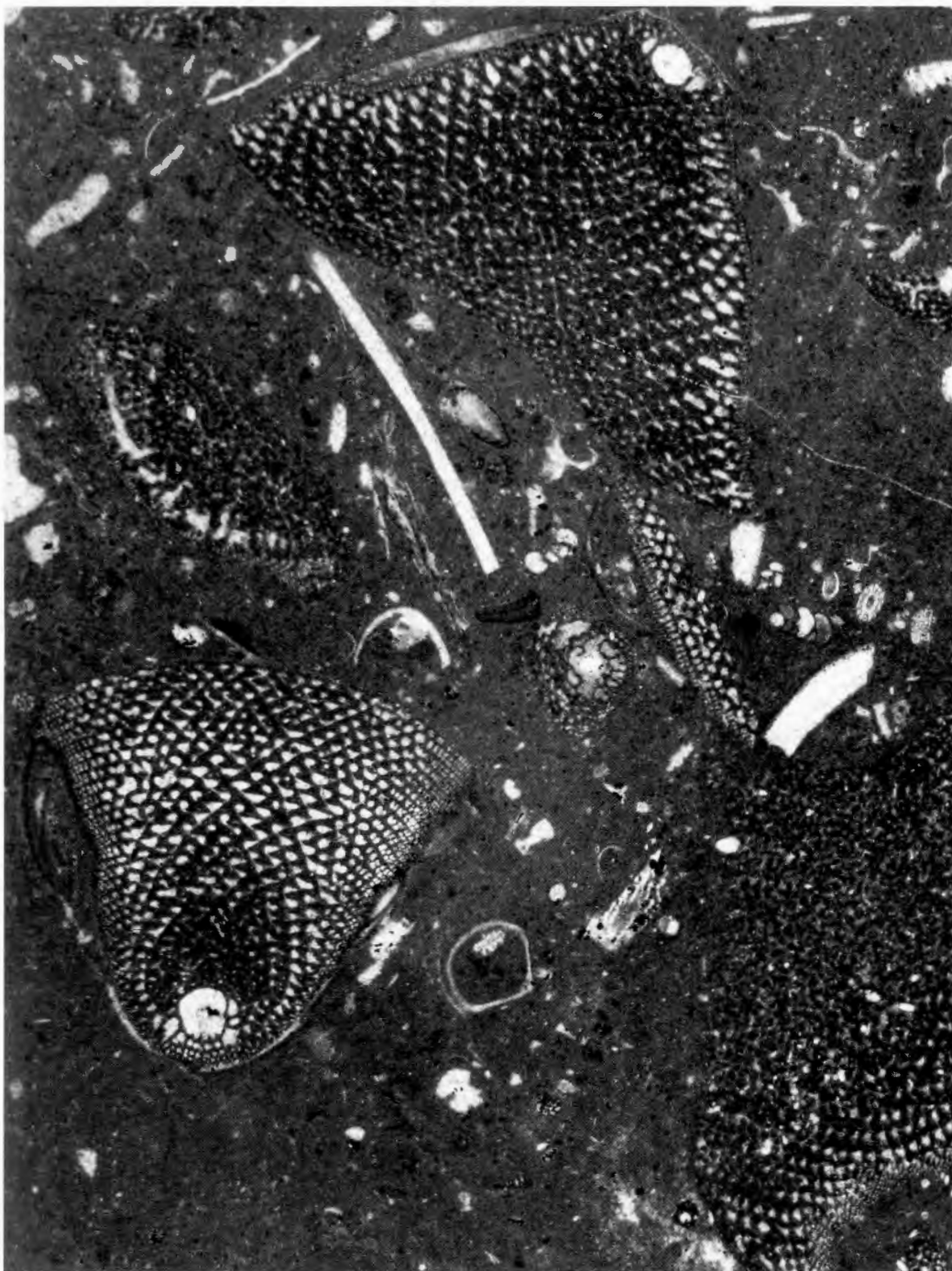


Debarina hahounerensis FOURCADE, RAOULT
& VILA (X 90) (left).
LOWER APTIAN of Capo d'Orlando,
Campania, Italy.

Debarina hahounerensis FOURCADE, RAOULT
& VILA (X 70) (middle).
LOWER APTIAN of S. Maria 4 well,
Abruzzo, Italy.

Debarina hahounerensis FOURCADE, RAOULT
& VILA (X 70) (right).
LOWER APTIAN of Murge, Apulia, Italy.

NEOCOMIAN				SENONIAN					
BERRIASIAN	VALANGINIAN	HAUTERVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	MAASTRICHTIAN
			■						

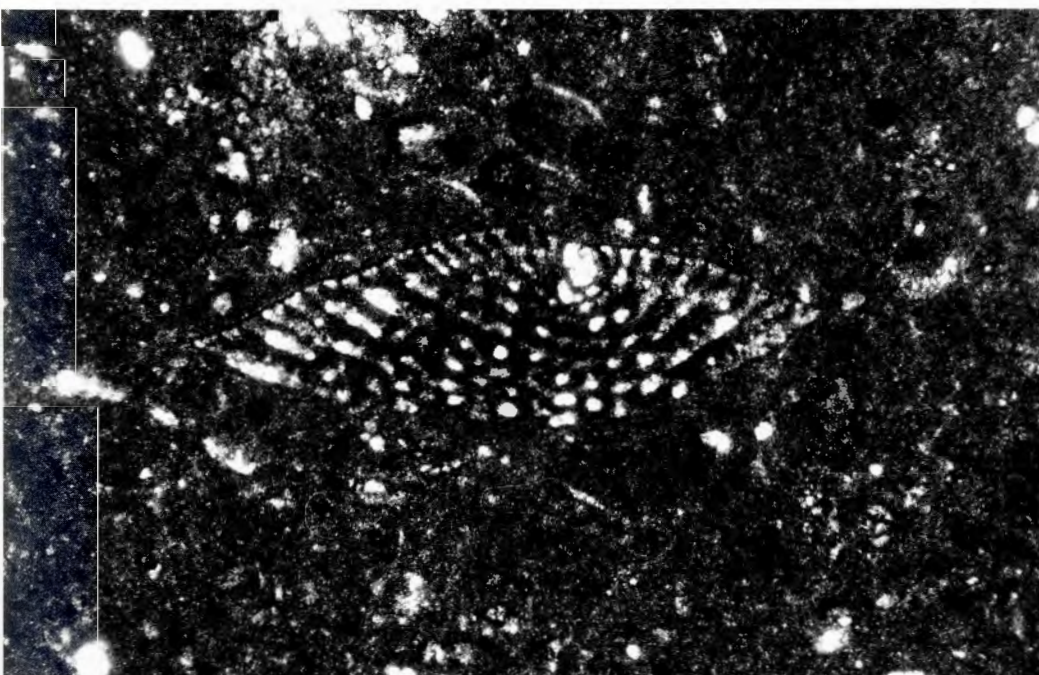


Palorbitolina lenticularis (BLUMENBACH)
(X 20). Detail of axial section through the
megalospheric embryonic apparatus
(X 60).
LOWER APTIAN of Ras Sharwayn, P.D.R.
of Yemen.

NEOCOMIAN					SENONIAN				
BERRIASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	MAASTRICHTIAN



Axial and basal sections of the megalospheric embryonic apparatus of the *Orbitolinidae* are important for the determination of these foraminifers.



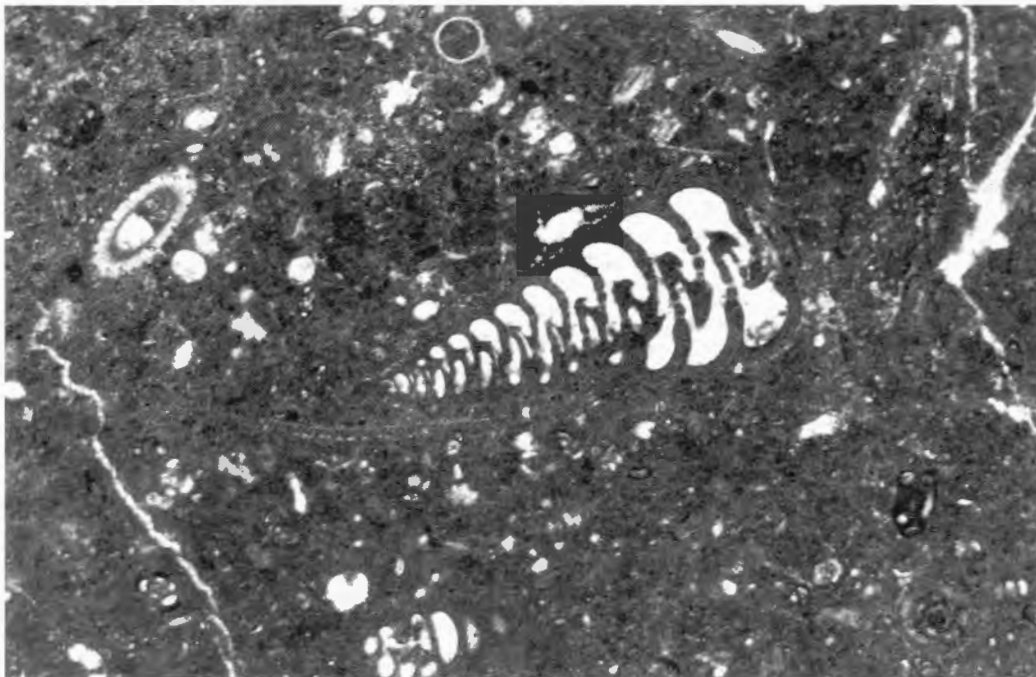
Praeorbitolina wienandsi SCHROEDER
(X 65).
LOWER APTIAN of Jabal Daliya, P.D.R.
of Yemen.
Detail of axial section through the
megalospheric embryonic apparatus from
SCHROEDER 1979 (X 90).

NEOCOMIAN					SENONIAN				
BERRIASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	MAASTRICHTIAN

The genus *Praeorbitolina*, which includes *Praeorbitolina cormyi* SCHROEDER and *Praeorbitolina wienandsi* SCHROEDER, is typical of the EARLY APTIAN.

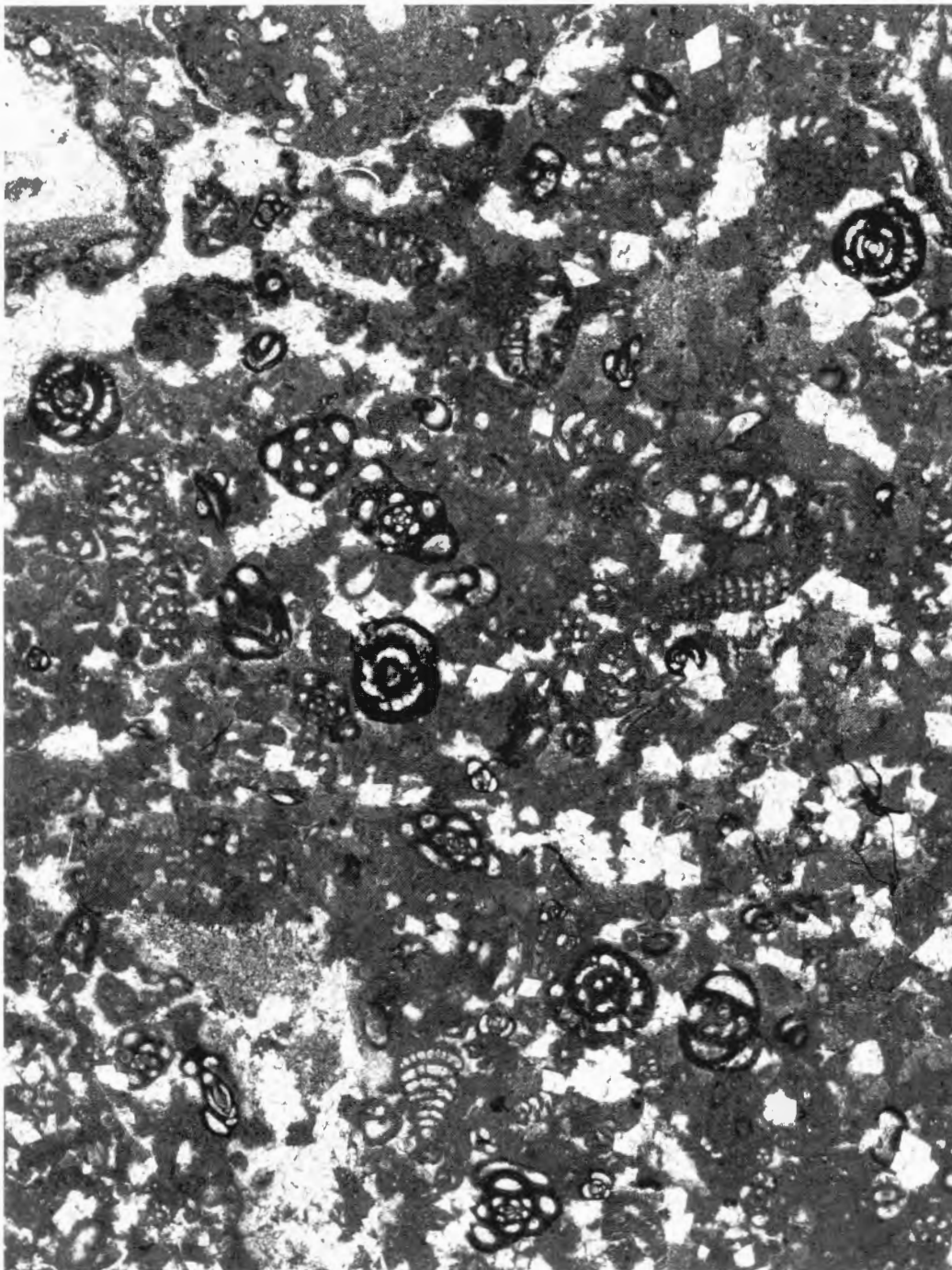






Praechrysalidina infracretacea LUPERTO SINNI. *Salpingoporella dinarica* RADOIČIĆ is also present (X 25). LOWER APTIAN of Casalbordino 2 well, Abruzzo, Italy.

NEOCOMIAN				SENONIAN							
BERRIASIAN	VALANGINIAN	HAUTERVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACAN	SANTONIAN	CAMPANIAN	MAASTRICHTIAN

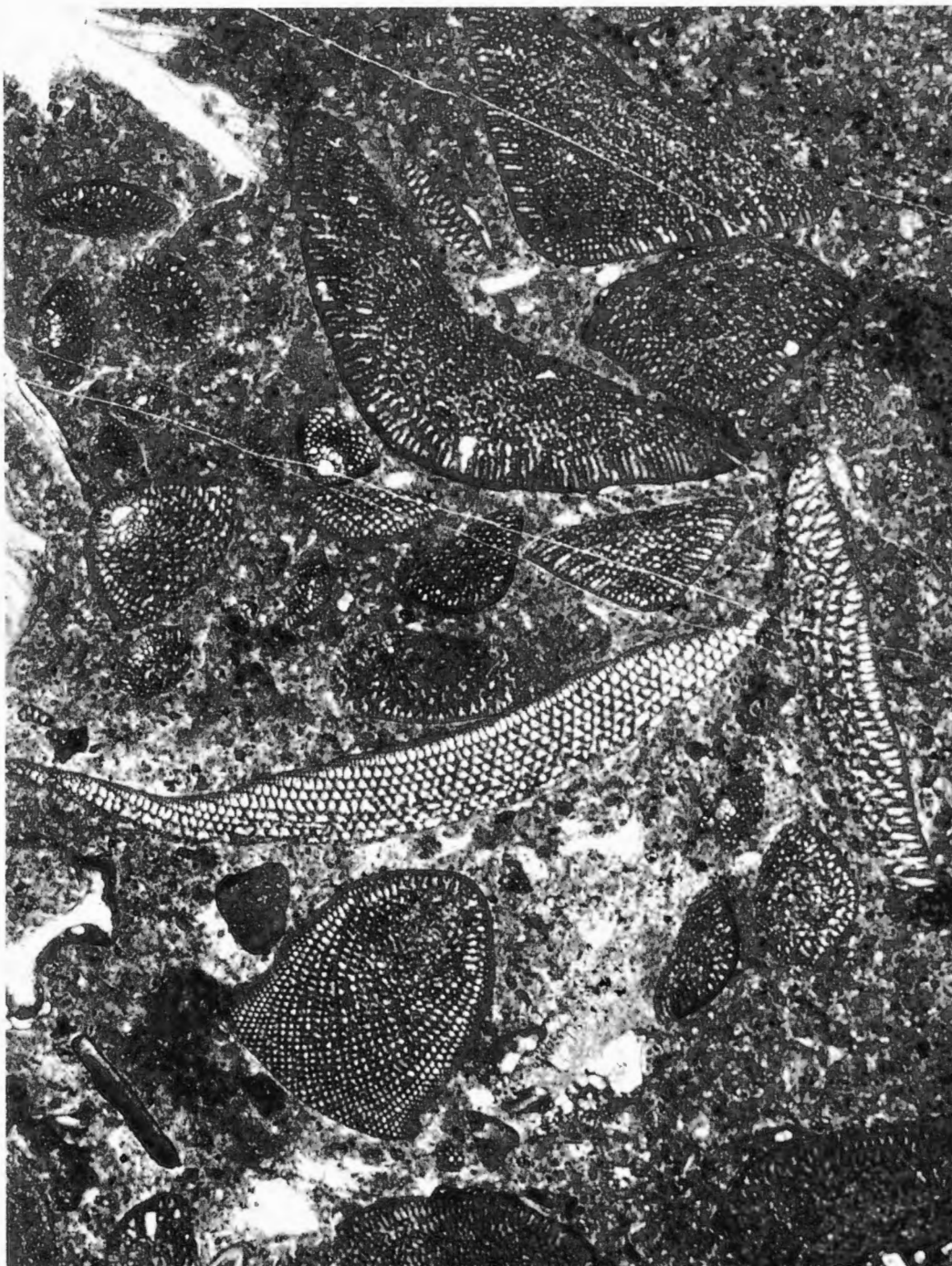


Ovalveolina reicheli DE CASTRO. *Pseudotextulariella? scarsellai* (DE CASTRO), *Cuneolina*, *Textulariidae* and *Miliolidae* are present (X 20). UPPER APTIAN of Cerreto Sannita, Campania, Italy. Detail (X 30).

NEOCOMIAN				SENONIAN							
BERRIASIAN	VALANGINIAN	HAUTERVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACAN	SANTONIAN	CAMPANIAN	MAASTRICHTIAN

This is one of the oldest forms belonging to the *Alveolinidae*.

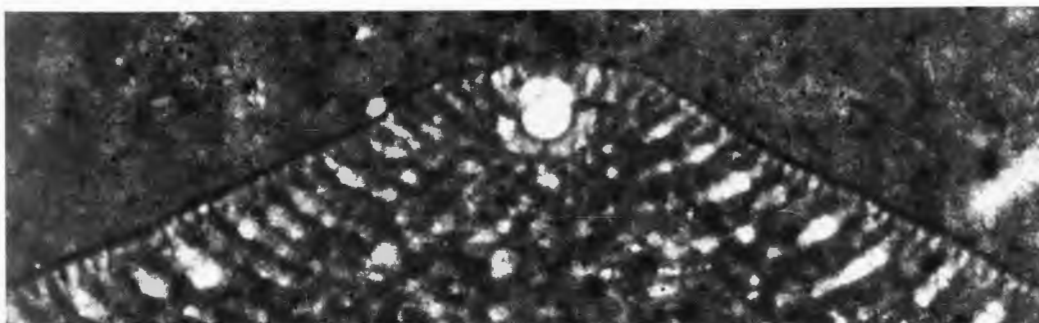




Orbitolina (Mesorbitolina) texana (ROEMER)
(X 15).

LOWER ALBIAN of Ras Fartaq, P.D.R.
of Yemen.

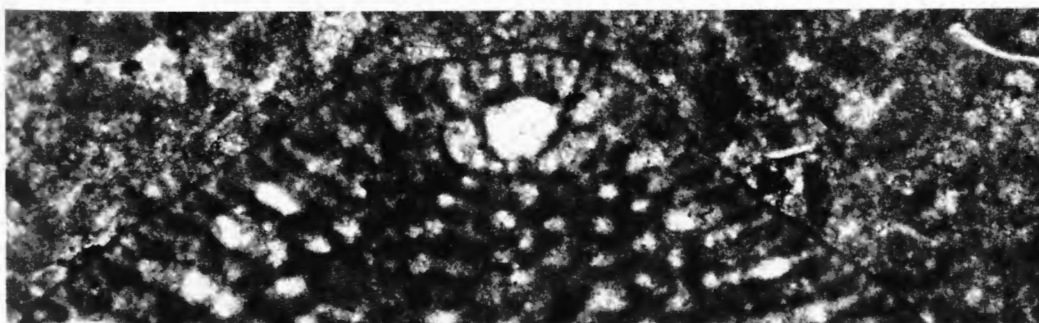
The *Orbitolina texana* group is important for the
identification of sediments of the LATE APTIAN-
MIDDLE ALBIAN.



Orbitolina (Mesorbitolina) parva DOUGLASS
(X 80).

UPPER APTIAN of Qalana, P.D.R.
of Yemen.

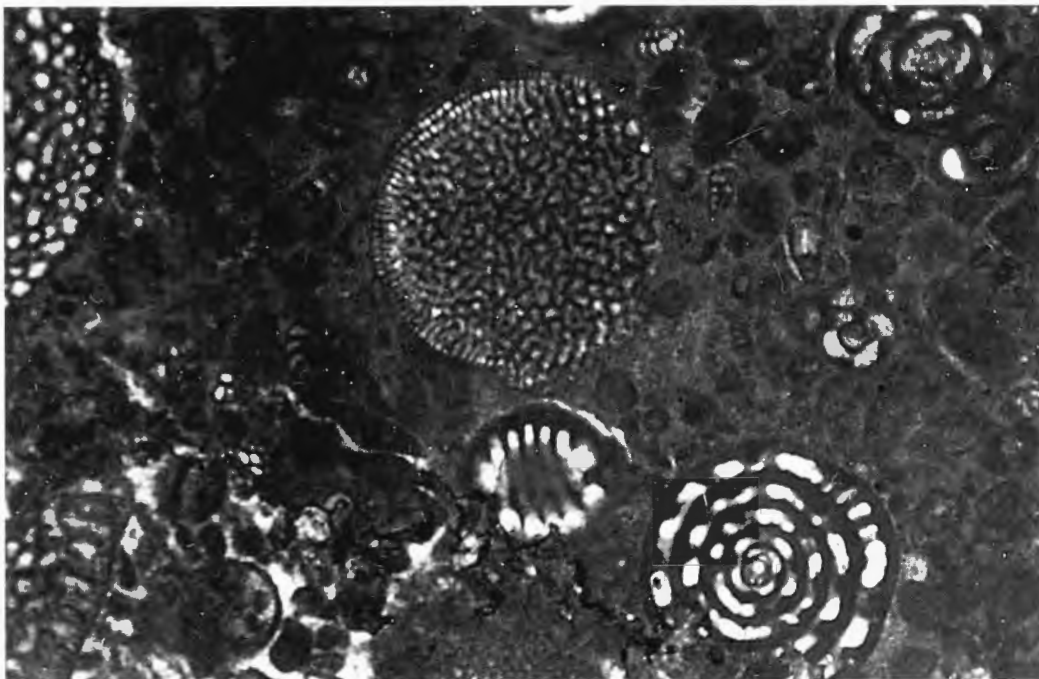
NEOCOMIAN				SENONIAN							
BERRASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN	CAMPANIAN	MAASTRICHTIAN



Orbitolina (Mesorbitolina) texana (ROEMER)
(X 90).

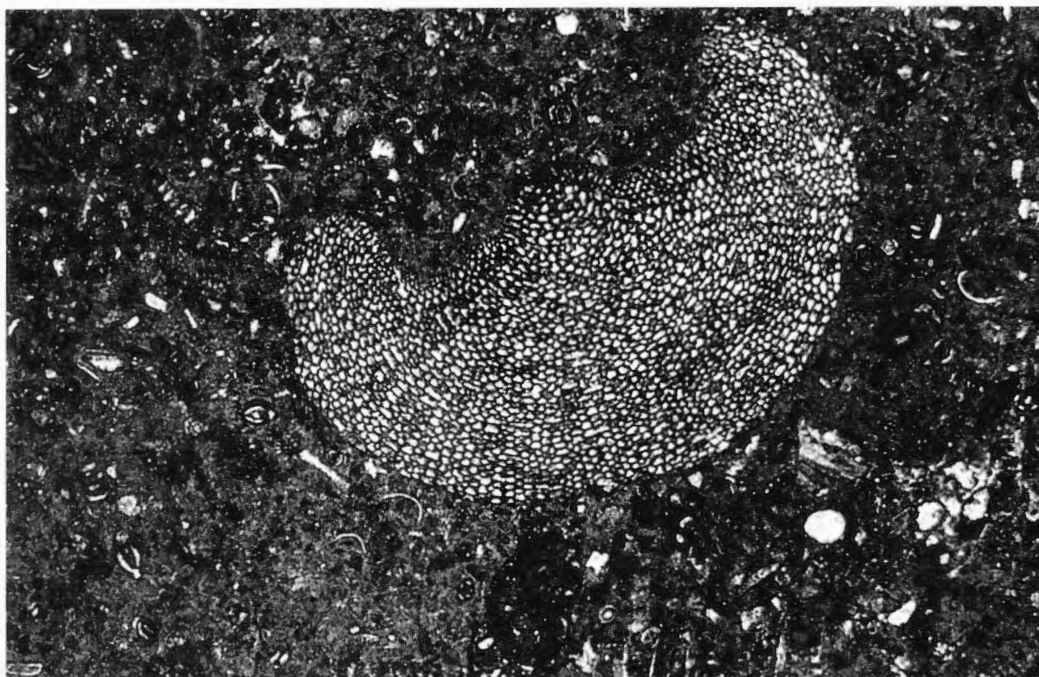
LOWER ALBIAN of Qalana, P.D.R.
of Yemen.

NEOCOMIAN				SENONIAN							
BERRASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN	CAMPANIAN	MAASTRICHTIAN



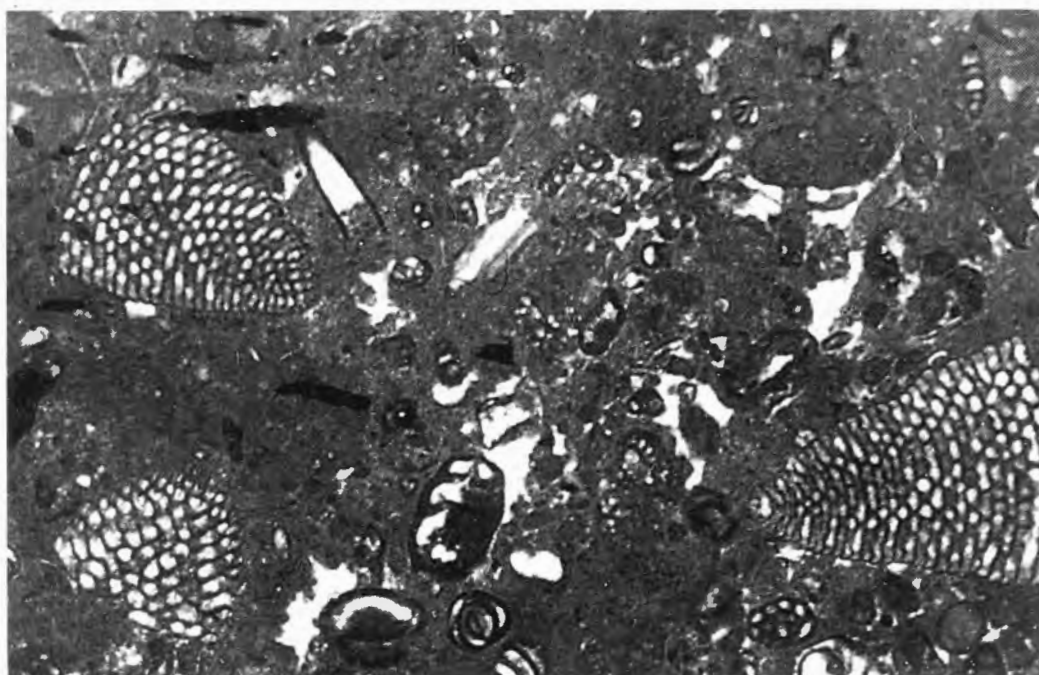
Ovalveolina crassa DE CASTRO. *Neoiragia convexa* DANILOVA, *Cuneolina pavonia* HENSON and *Miliolidae* are present (X 30). UPPER ALBIAN of A1/NC-120 well, Cyrenaica offshore, Libya.

NEOCOMIAN								SENONIAN			
BERRIASIAN	VALANGINIAN	HAUTERVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN	CAMPANIAN	MAASTRICHTIAN



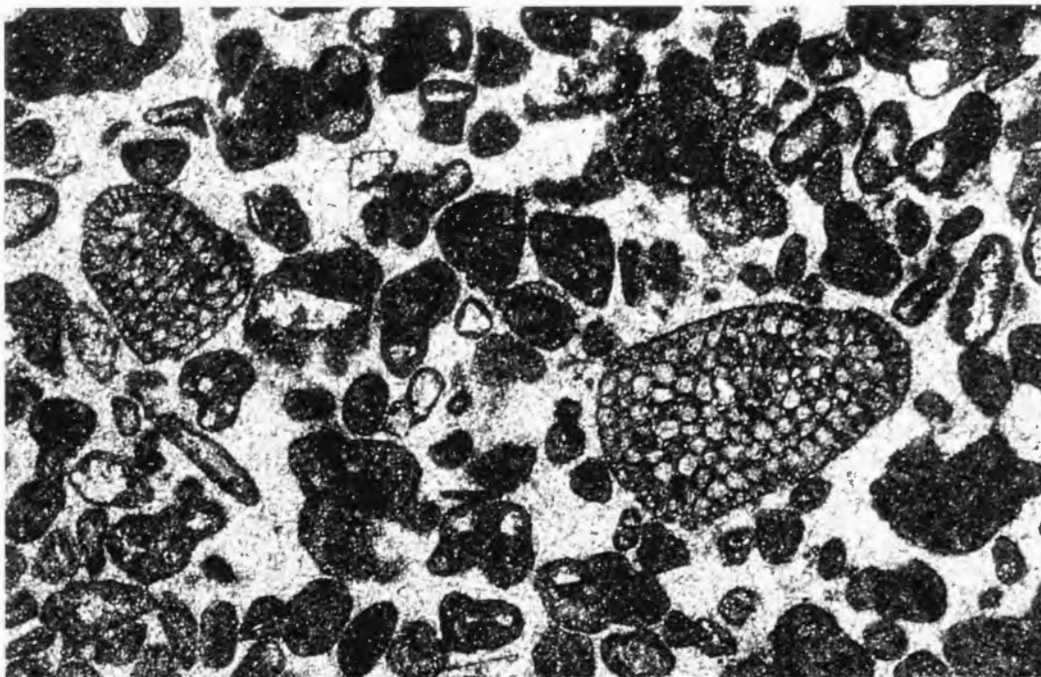
Neoiragia convexa DANILOVA (X 16). UPPER ALBIAN of Nervesa 1 well, Venetia, Italy.

NEOCOMIAN								SENONIAN			
BERRIASIAN	VALANGINIAN	HAUTERVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN	CAMPANIAN	MAASTRICHTIAN



Neoiragia insolita (DECROUEZ & MOULLADE) (X 30). UPPER ALBIAN of Polcenigo, Friuli, Italy.

NEOCOMIAN								SENONIAN			
BERRIASIAN	VALANGINIAN	HAUTERVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN	CAMPANIAN	MAASTRICHTIAN



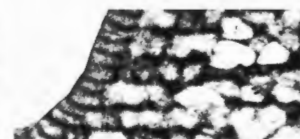
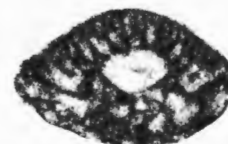
Orbitolina (Conicorbitolina) cuvillieri
(MOULLADE) (X 40).
UPPER ALBIAN-LOWER CENOMANIAN
of Cellina Valley, Friuli, Italy.
Detail of axial section through the
megalospheric embryonic apparatus from
LOWER CENOMANIAN of Judrio Valley,
Friuli, Italy (X 60).

NEOCOMIAN							SENONIAN					
BERRIASIAN	VALANGINIAN	HAUTERIVIAN					BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN

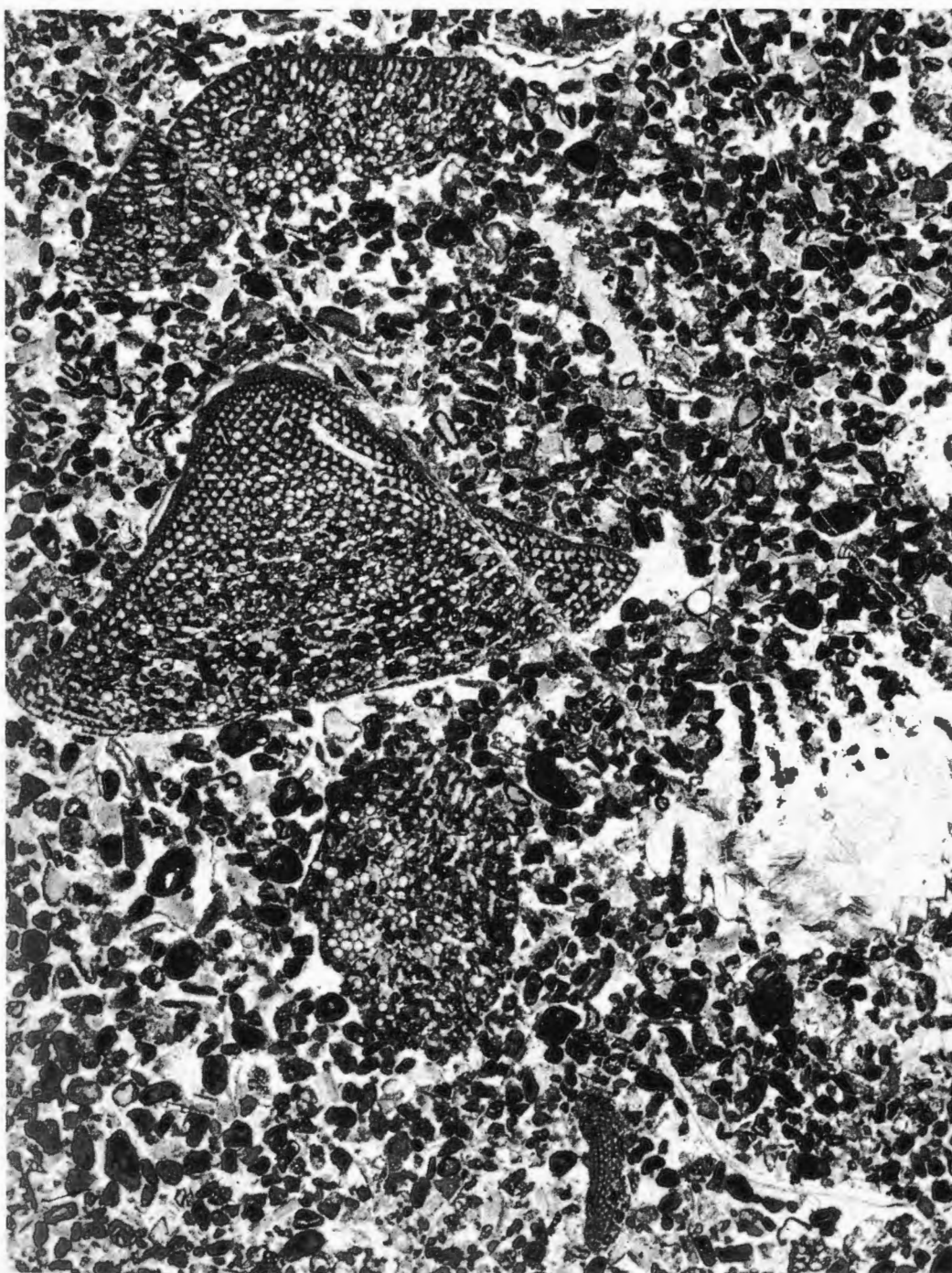


Orbitolina (Conicorbitolina) conica
(D'ARCHIAC) (X 15).
LOWER CENOMANIAN of Judrio Valley,
Friuli, Italy.
Detail of axial section through the
megalospheric embryonic apparatus from
LOWER CENOMANIAN of Anna 1 well,
Adriatic Sea (X 50).

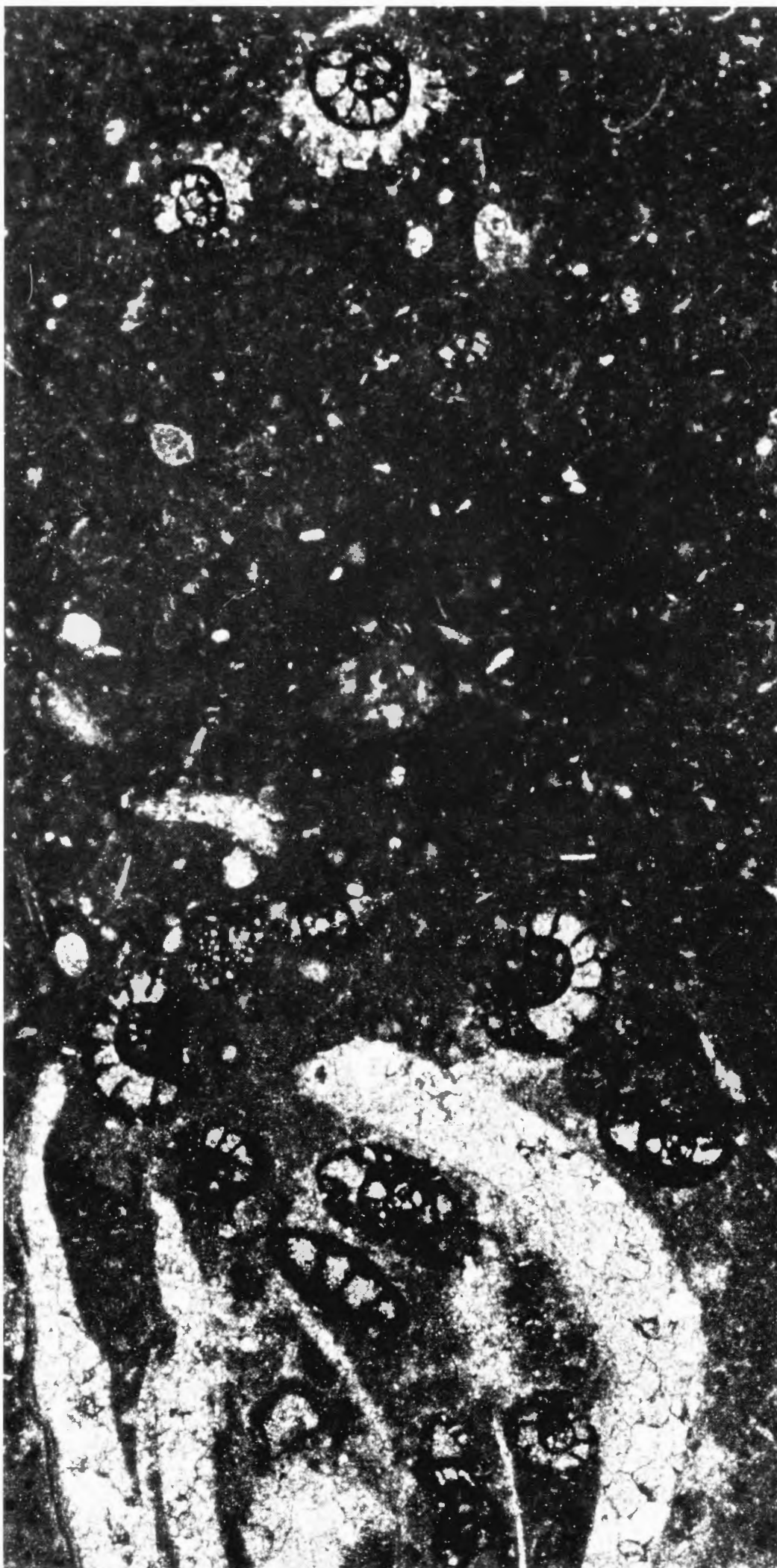
NEOCOMIAN						SENONIAN					
BERRIASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN	CAMPANIAN	MAASTRICHTIAN



The characteristic feature of the subgenus
Conicorbitolina is the clearly delimited alveolar layer
of the marginal zone. Detail of marginal zone after
SCHROEDER 1962 (X 50).



COLL.: VENTURINI



Hemicyclammina sigali MAYNC (X 25).
Detail (X 40).
LOWER CENOMANIAN of
Tang-e-Khanneshin, Zagros, Iran.

NEOCOMIAN							SENONIAN				
BERRIASIAN	VALANGINIAN	HAUTERVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN	CAMPANIAN	MAASTRICHTIAN

This foraminifer in Southern Tethys Domain is common in North Africa and in the Middle East.



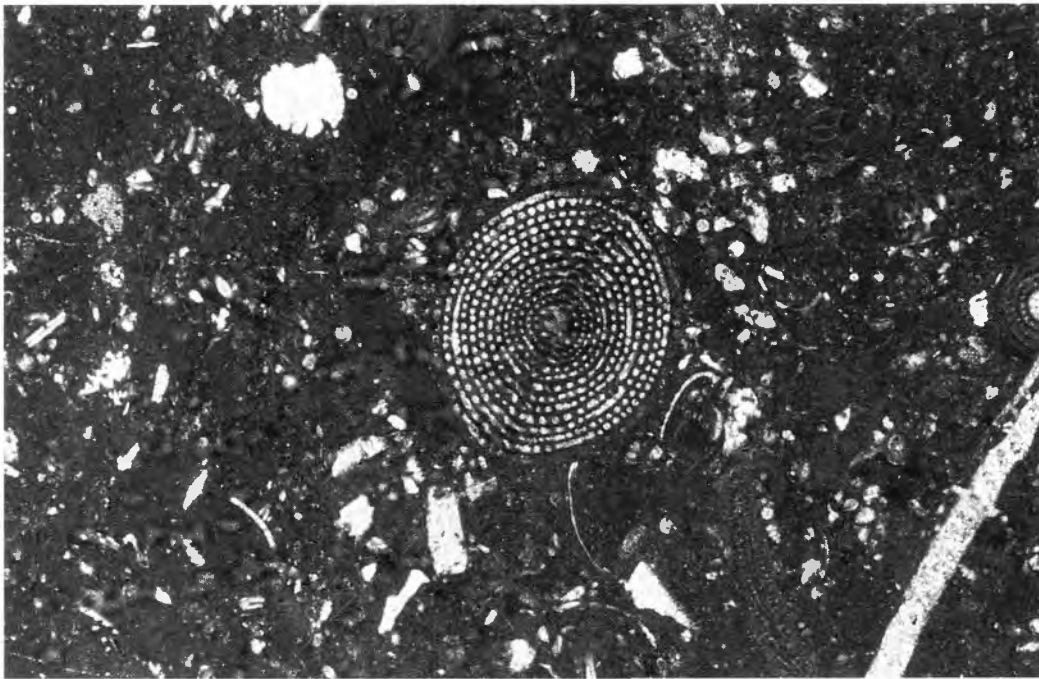
Opposite page
Orbitolina (*Orbitolina*) gr. *concava*
(LAMARCK) (X 10).
LOWER CENOMANIAN of
Tang-e-Khanneshin, Zagros, Iran.
Detail of axial section through the
megalospheric embryonic apparatus of
Orbitolina (*Orbitolina*) *sefini* HENSON from
SCHROEDER & NEUMANN 1985 (X 60).

NEOCOMIAN							SENONIAN				
BERRIASIAN	VALANGINIAN	HAUTERVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN	CAMPANIAN	MAASTRICHTIAN

Orbitolina (*Orbitolina*) *sefini* belongs to *Orbitolina*
(*Orbitolina*) *concava* group.



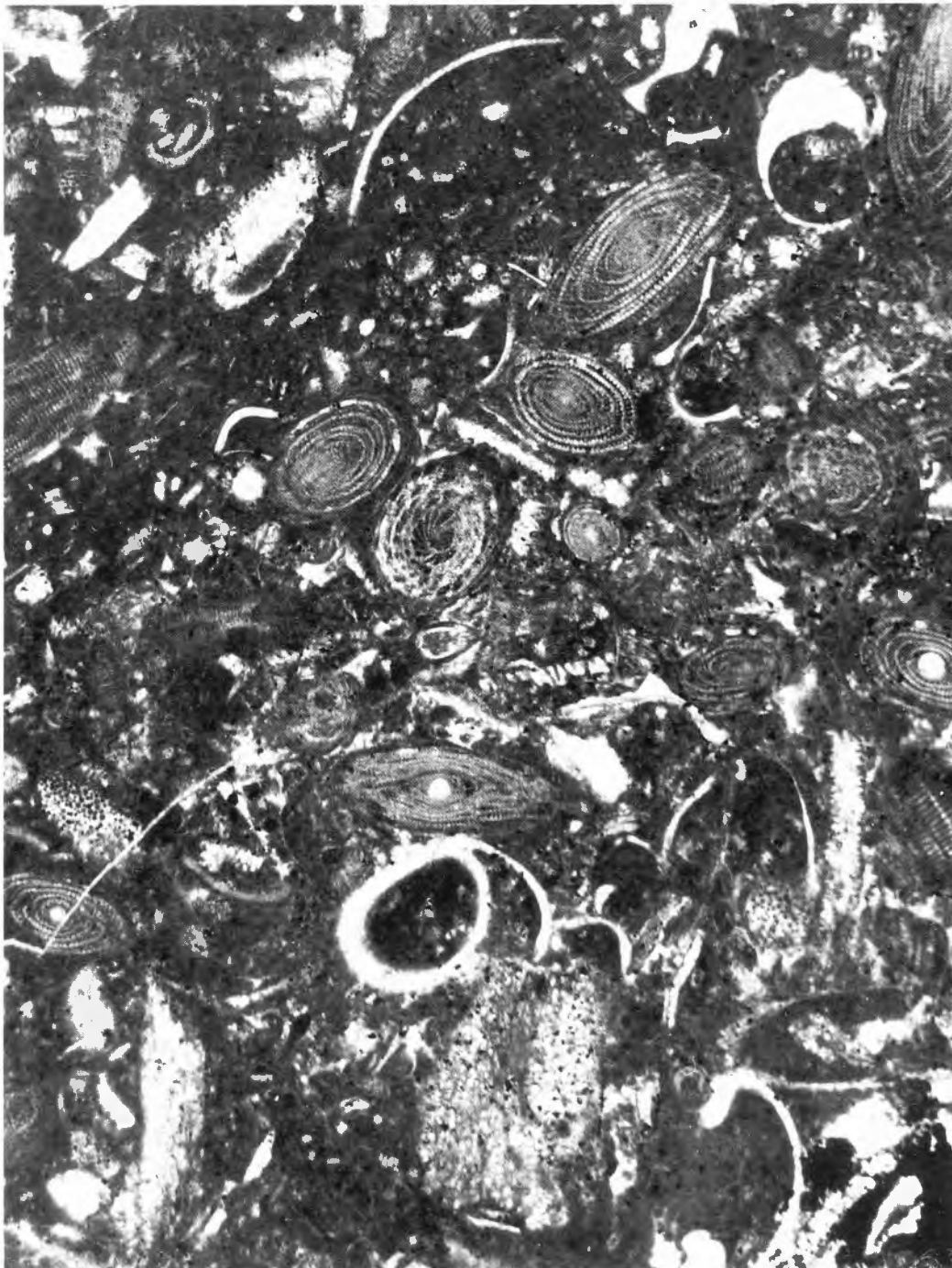




Praealveolina simplex REICHEL (X 20).
LOWER CENOMANIAN of Tang-e-Chin,
Zagros, Iran.

NEOCOMIAN						SENONIAN					
BERRASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN	CAMPANIAN	MAASTRICHTIAN

Praealveolina in the Southern Tethys Domain is common in the Middle East.

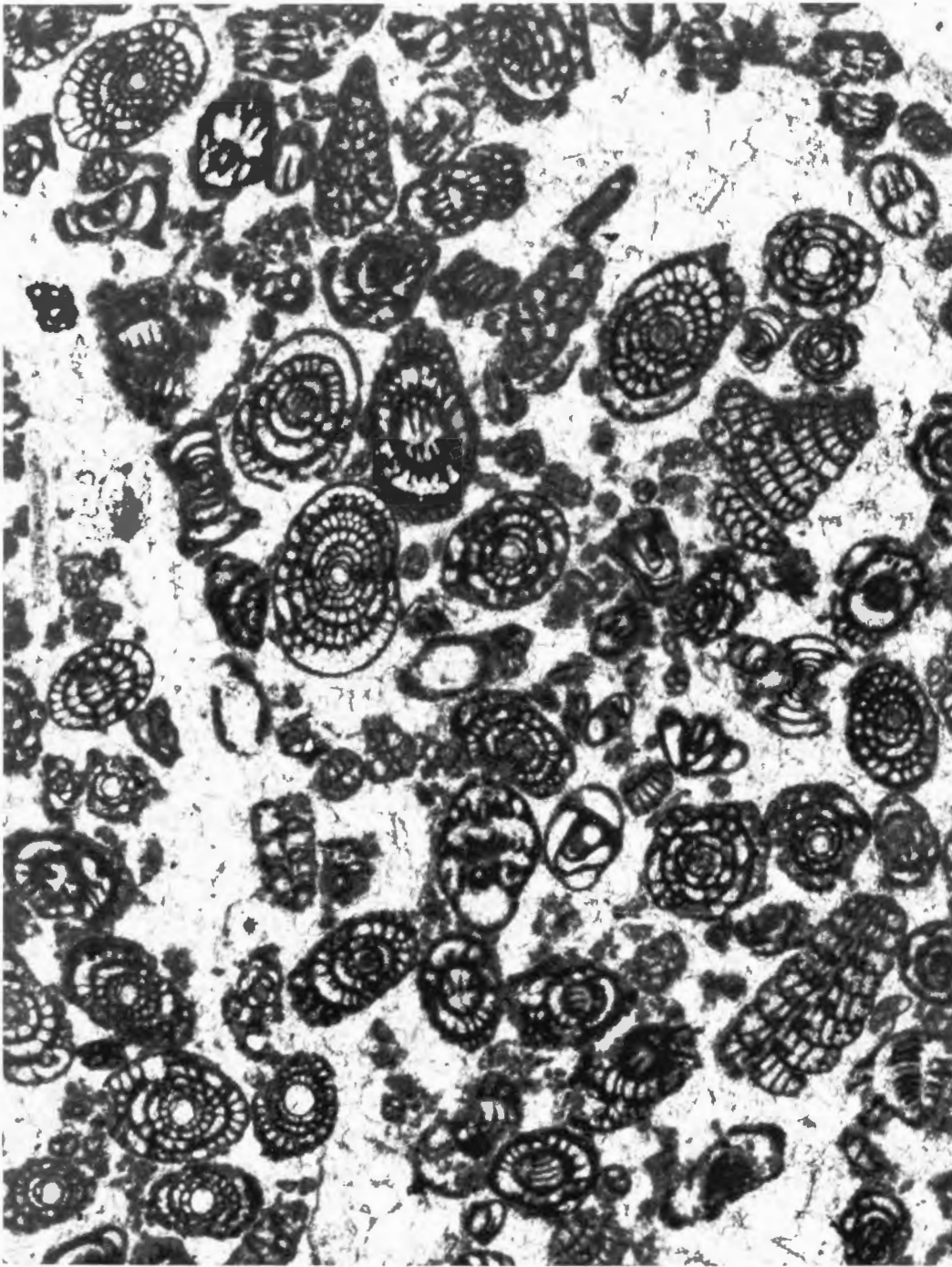


Praealveolina gr. cretacea (D'ARCHIAC)
(X 25). Detail (X 40).
MIDDLE CENOMANIAN of Ras Fartaq,
P.D.R. of Yemen.

NEOCOMIAN						SENONIAN					
BERRASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN	CAMPANIAN	MAASTRICHTIAN

In the Southern Tethys Domain this group of Alveolinids is common in the Middle East.

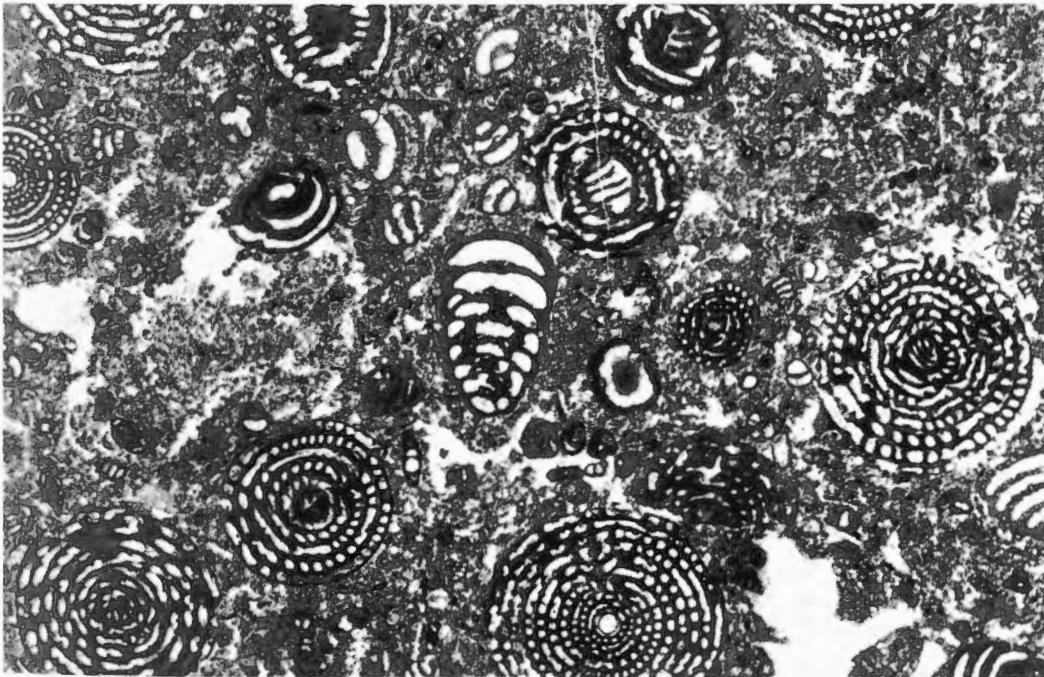




COLL.: DE CASTRO, INST. OF PALEONT. UNIV. OF NAPLES

Sellialveolina vialii COLALONGO. *Cuneolina pavonia* D'ORBIGNY, *Textulariidae*, *Ophthalmitidae* and *Miliolidae* are present (X 35).
 LOWER CENOMANIAN of Caserta, Campania, Italy.

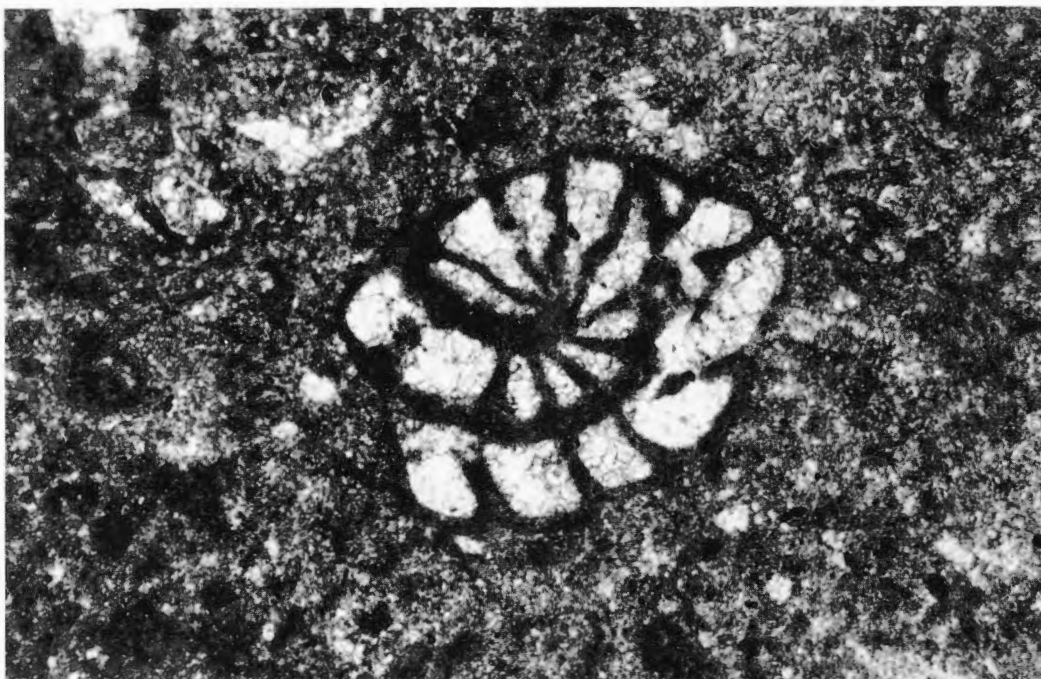
NEOCOMIAN							SENONIAN				
BERRIASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN	CAMPANIAN	MAASTRICHTIAN



COLL.: DE CASTRO, INST. OF PALEONT. UNIV. OF NAPLES

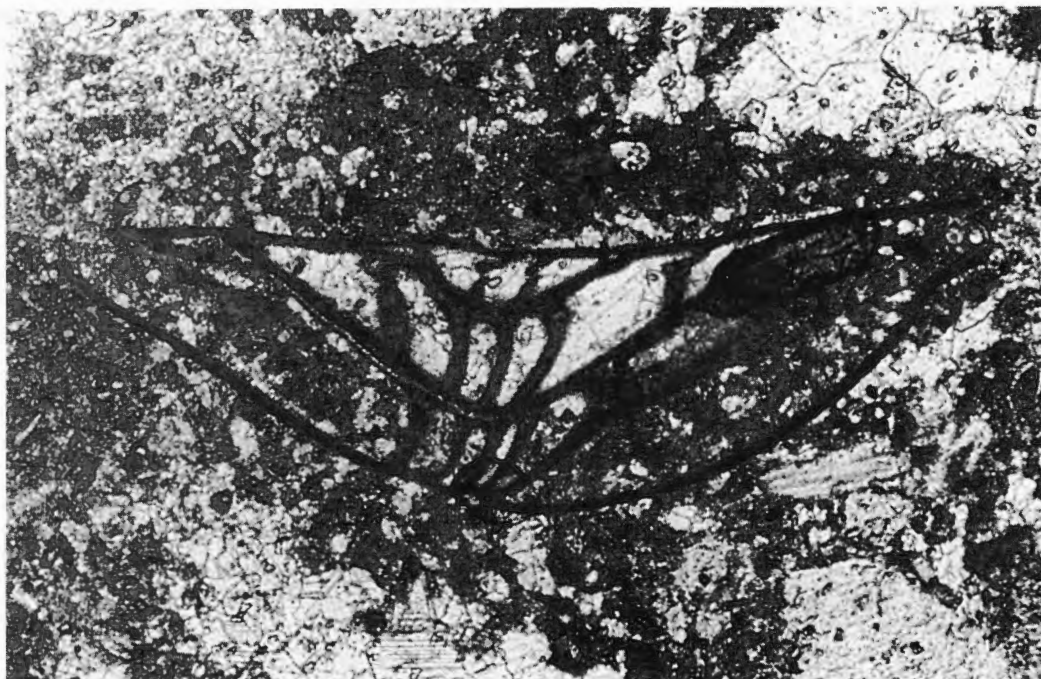
Cisalveolina fraasi (GÜMBEL). *Chrysalidina gradata* D'ORBIGNY is also present (X 10).
 UPPER CENOMANIAN of Caserta, Campania, Italy.

NEOCOMIAN							SENONIAN				
BERRIASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN	CAMPANIAN	MAASTRICHTIAN



Nezzazata (X 80).
MIDDLE CENOMANIAN of Cellina Valley,
Friuli, Italy.

Nezzazatidae develop an important evolutive trend
during the CENOMANIAN.



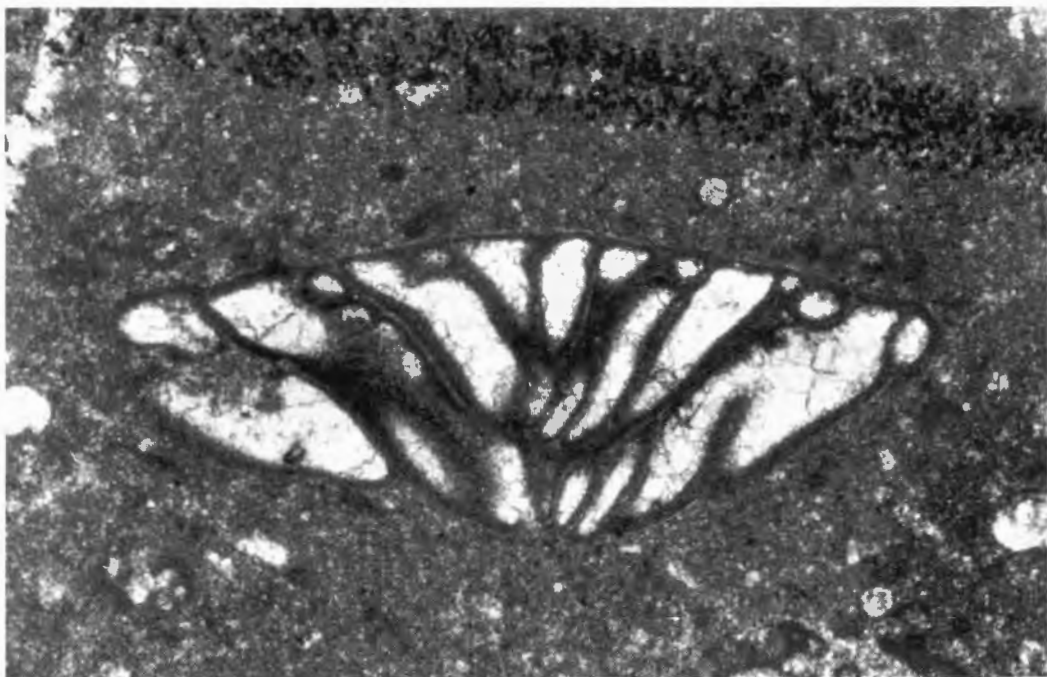
Nezzazata simplex OMARA (X 60).
UPPER CENOMANIAN of Tang-e-Kord,
Zagros, Iran.

NEOCOMIAN						SENONIAN				
BERRIASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN	CAMPANIAN
										MAASTRICHTIAN



Nezzazata conica (SMOUT) (X 80).
UPPER CENOMANIAN of Tang-e-Chin,
Zagros, Iran.

NEOCOMIAN						SENONIAN				
BERRIASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN	CAMPANIAN
										MAASTRICHTIAN



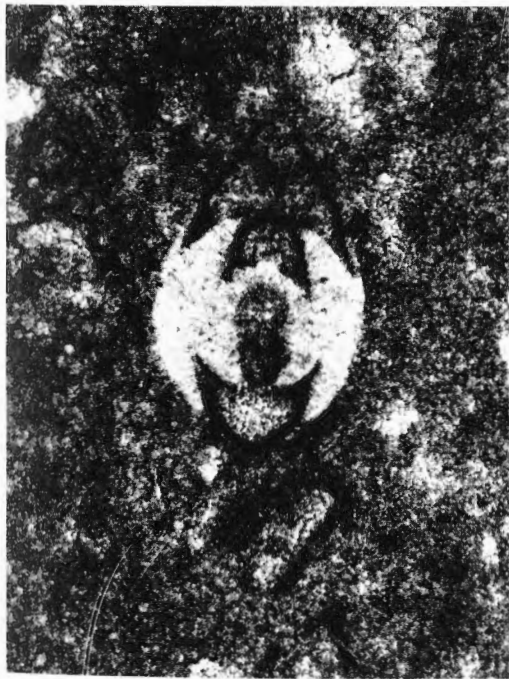
Trochospira avnimelechi HAMAOUÏ & SAINT-MARC (X 90).
UPPER CENOMANIAN of Tang-e-Kulek, Zagros, Iran.

NEOCOMIAN							SENONIAN					
BERRASIAN	VALANGINIAN	HAUTERVIAN					BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN



Biconcava bentori HAMAOUÏ & SAINT-MARC (X 120).
UPPER CENOMANIAN of Kuh-e-Shurom 2 well, Iran.

NEOCOMIAN						SENONIAN					
BERRIASIAN	VALANGINIAN	HAUTERVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN	CAMPANIAN	MAASTRICHTIAN

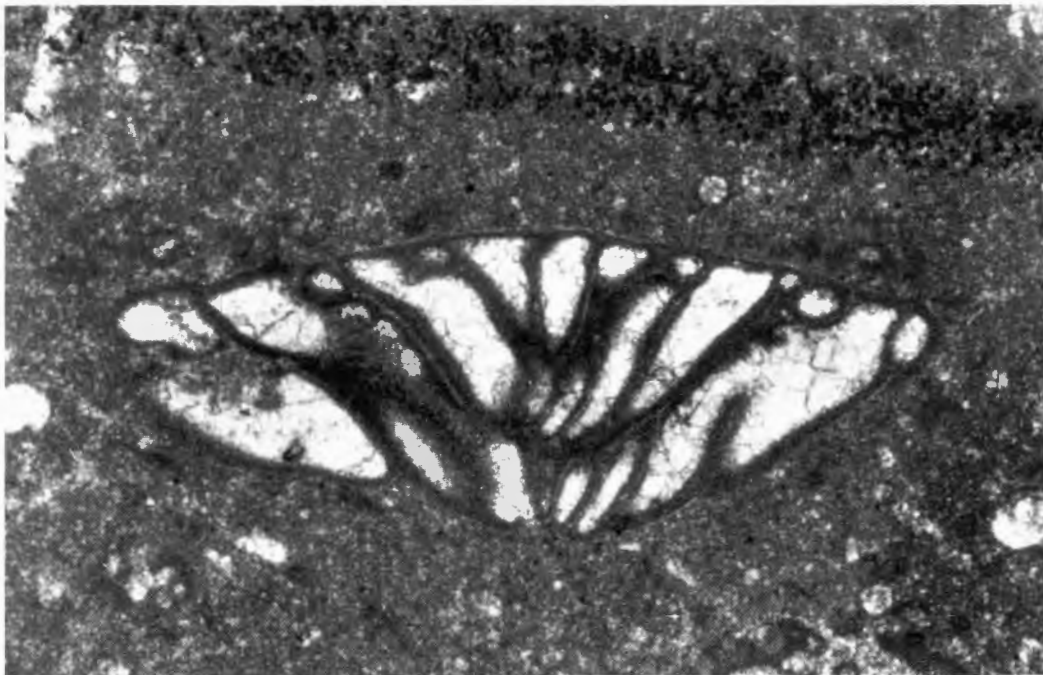


Nummofallotia apula LUPERTO SINNI (X 120) (left).
UPPER CENOMANIAN of Kuh-e-Shurom 2 well, Iran.



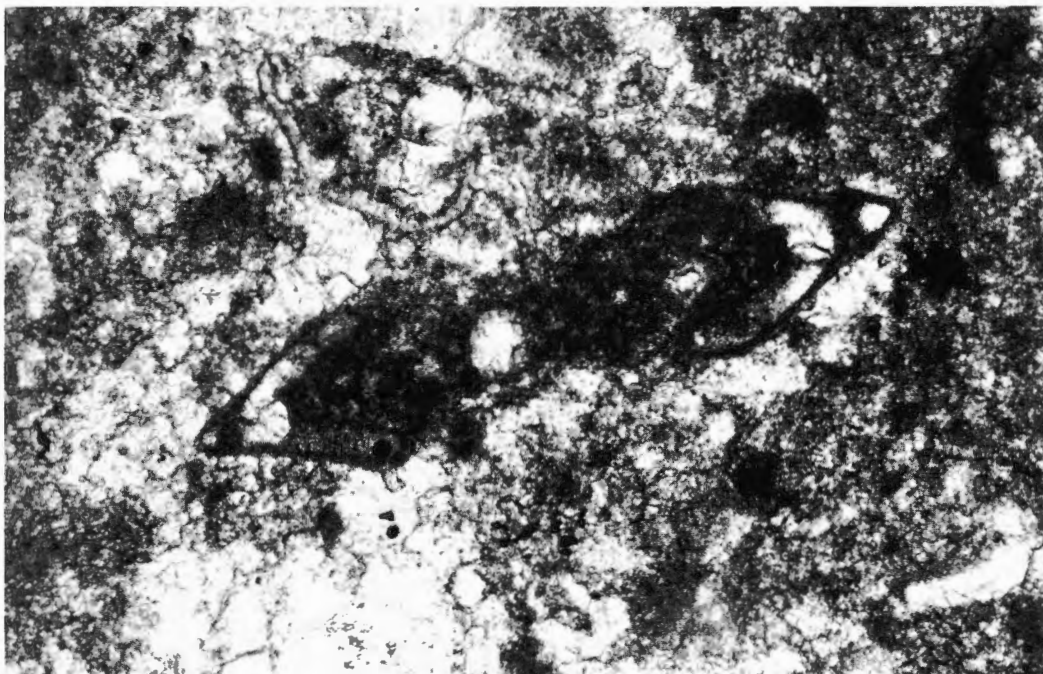
Nummofallotia apula LUPERTO SINNI (X 120) (right).
UPPER CENOMANIAN of Kuh-e-Shurom 2 well, Iran.

NEOCOMIAN						SENONIAN						
BERRIASIAN	VALANGINIAN	HAUTERVIAN				BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN



Trochospira avnimelechi HAMAOU & SAINT-MARC (X 90).
UPPER CENOMANIAN of Tang-e-Kulek, Zagros, Iran.

NEOCOMIAN						SENONIAN				
BERRIASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN	MAASTRICHTIAN



Biconcava bentori HAMAOU & SAINT-MARC (X 120).
UPPER CENOMANIAN of Kuh-e-Shurom 2 well, Iran.

NEOCOMIAN						SENONIAN				
BERRIASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN	MAASTRICHTIAN

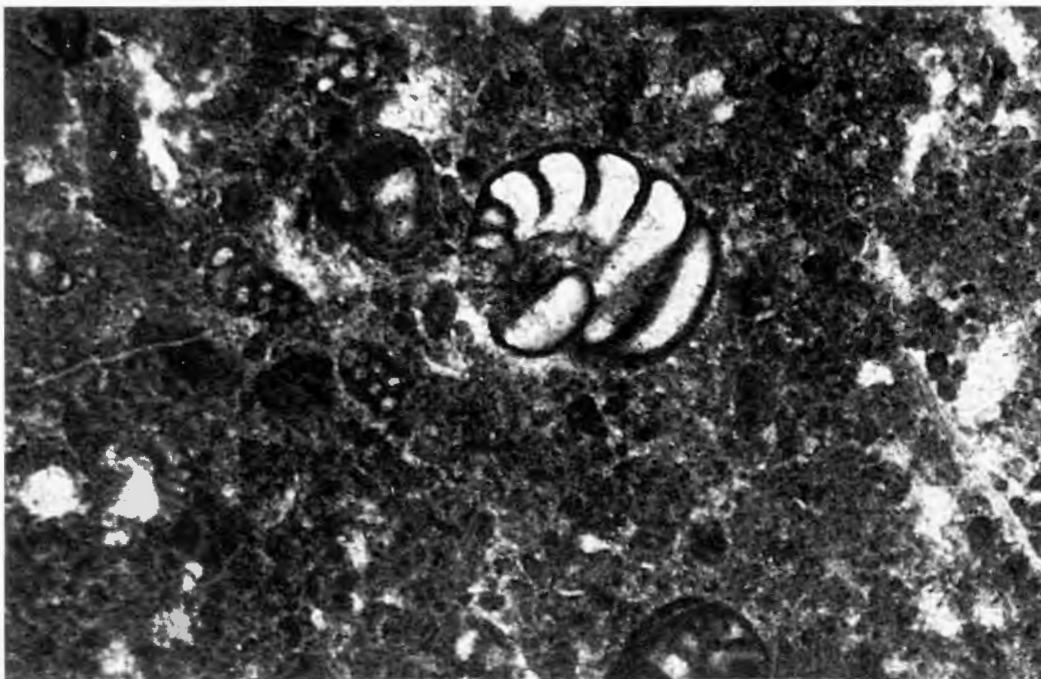


Nummofallotia apula LUPERTO SINNI (X 120) (left).
UPPER CENOMANIAN of Kuh-e-Shurom 2 well, Iran.



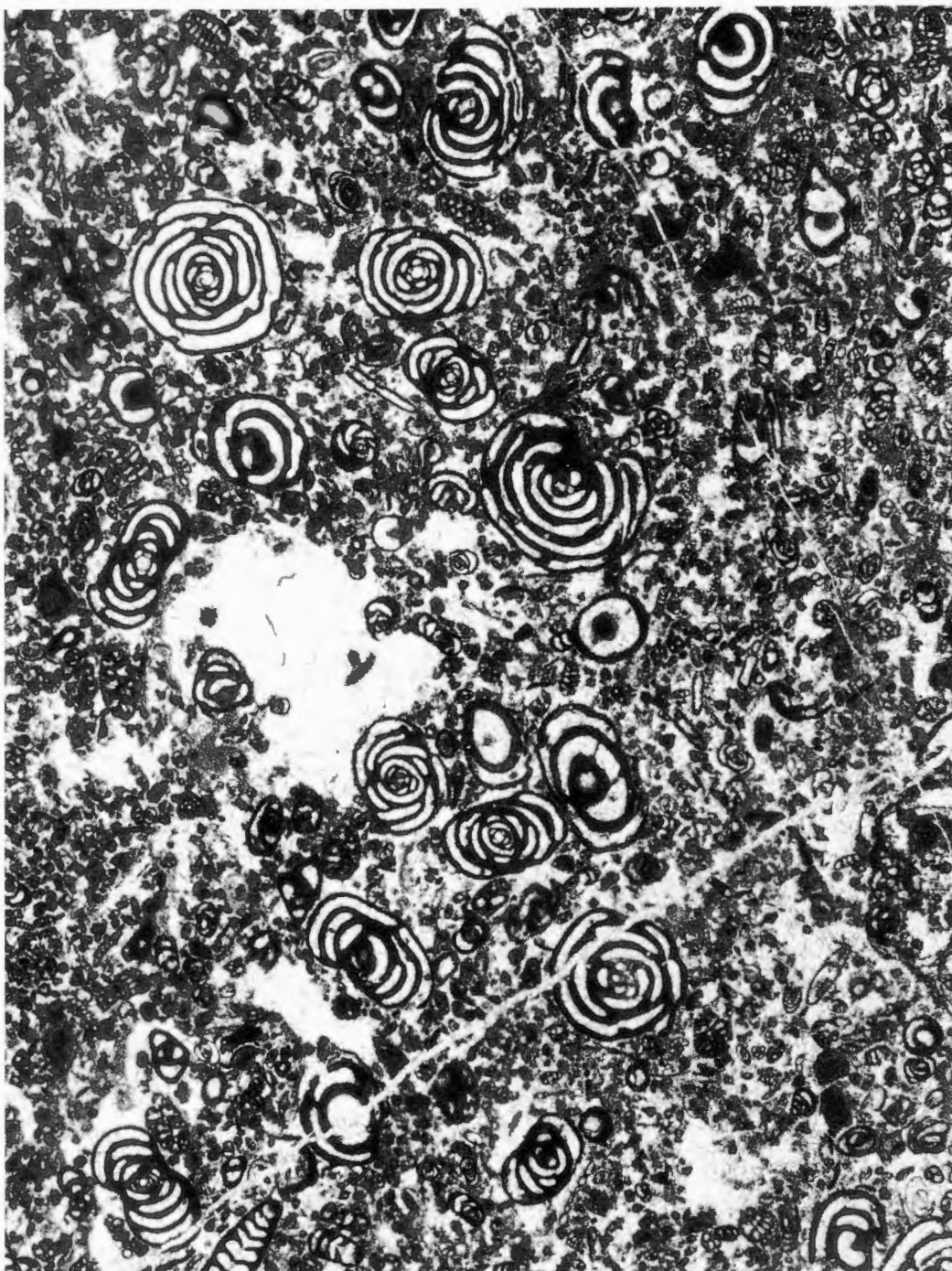
Nummofallotia apula LUPERTO SINNI (X 120) (right).
UPPER CENOMANIAN of Kuh-e-Shurom 2 well, Iran.

NEOCOMIAN						SENONIAN				
BERRIASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN	MAASTRICHTIAN



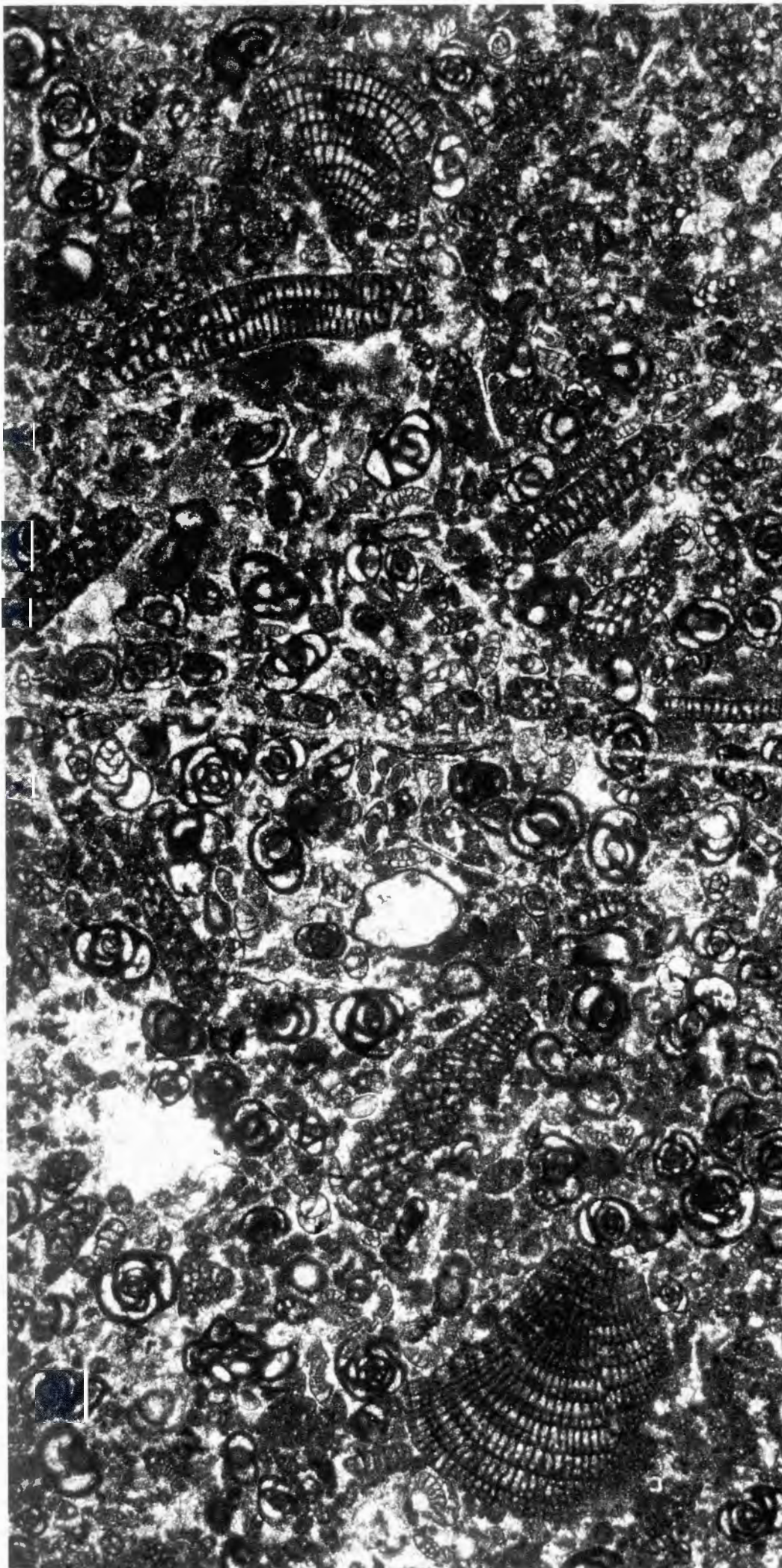
Nezzazatinella picardi (HENSON).
Textulariidae are present (X 70).
 UPPER ALBIAN-CENOMANIAN of
 Bagnolo in Piano 1 well, Emilia, Italy.

NEOCOMIAN				SENONIAN							
BEPHASICAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN	CAMPANIAN	MAASTRICHTIAN



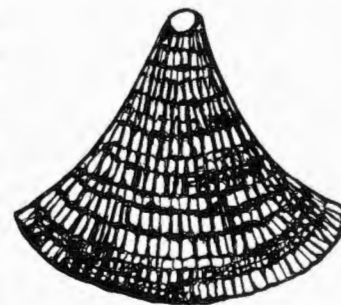
Pseudonummoloculina, *Miliolidae*,
Cuneolina pavonia D'ORBIGNY and
Pseudorhapydionina dubia (DE CASTRO) are
 also present (X 20).
 CENOMANIAN of Caserta, Campania,
 Italy.

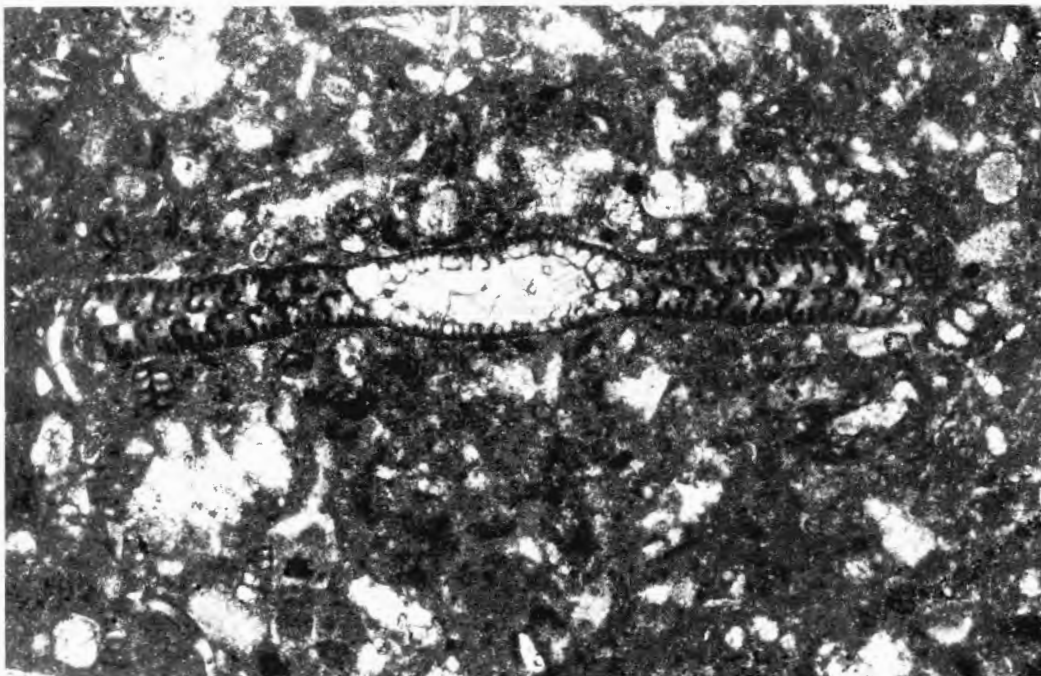
Miliolidae become common from the LATEST
 APTIAN - EARLY ALBIAN with different genera.
Nummuloculina and *Pseudonummoloculina* belong to
 this family.



Cuneolina pavonia D'ORBIGNY.
Nummofallotia, *Miliolidae*, *Valvulinidae* and
Textulariidae are present (X 40).
 LOWER SENONIAN of Cicerale 1 dir. well,
 Campania, Italy.
 Detail (X 30).

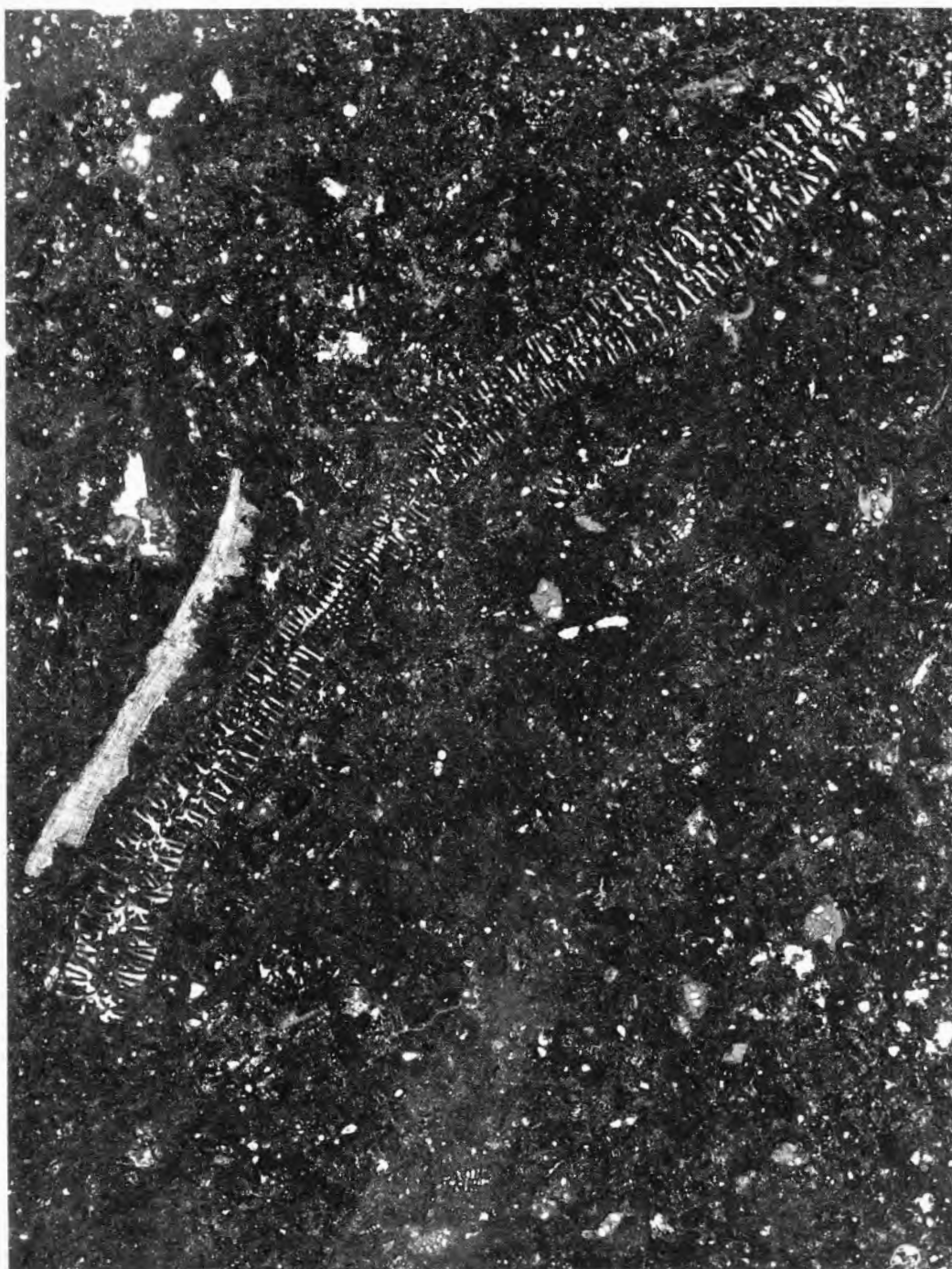
NEOCOMIAN								SENONIAN			
BERRIASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN	CAMPANIAN	MAASTRICHTIAN





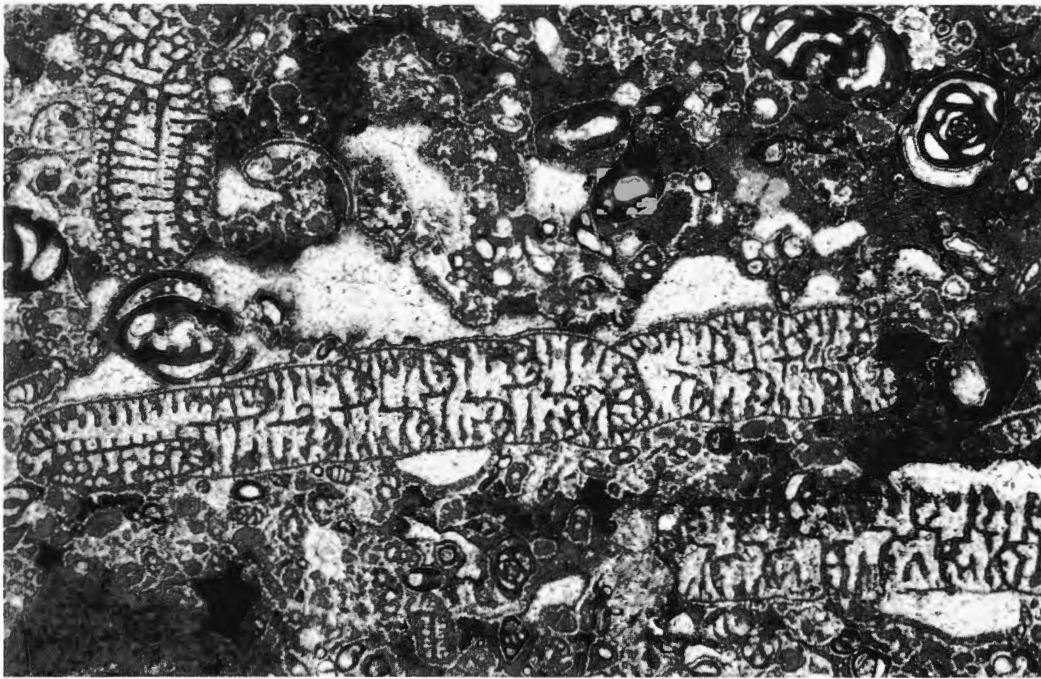
Dicyclina (X 30).
CENOMANIAN of Tang-e-Benori, Zagros,
Iran.

NEOCOMIAN								SENONIAN				
BERRIASIAN	VALANGINIAN	HAUTERVIAN						BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN



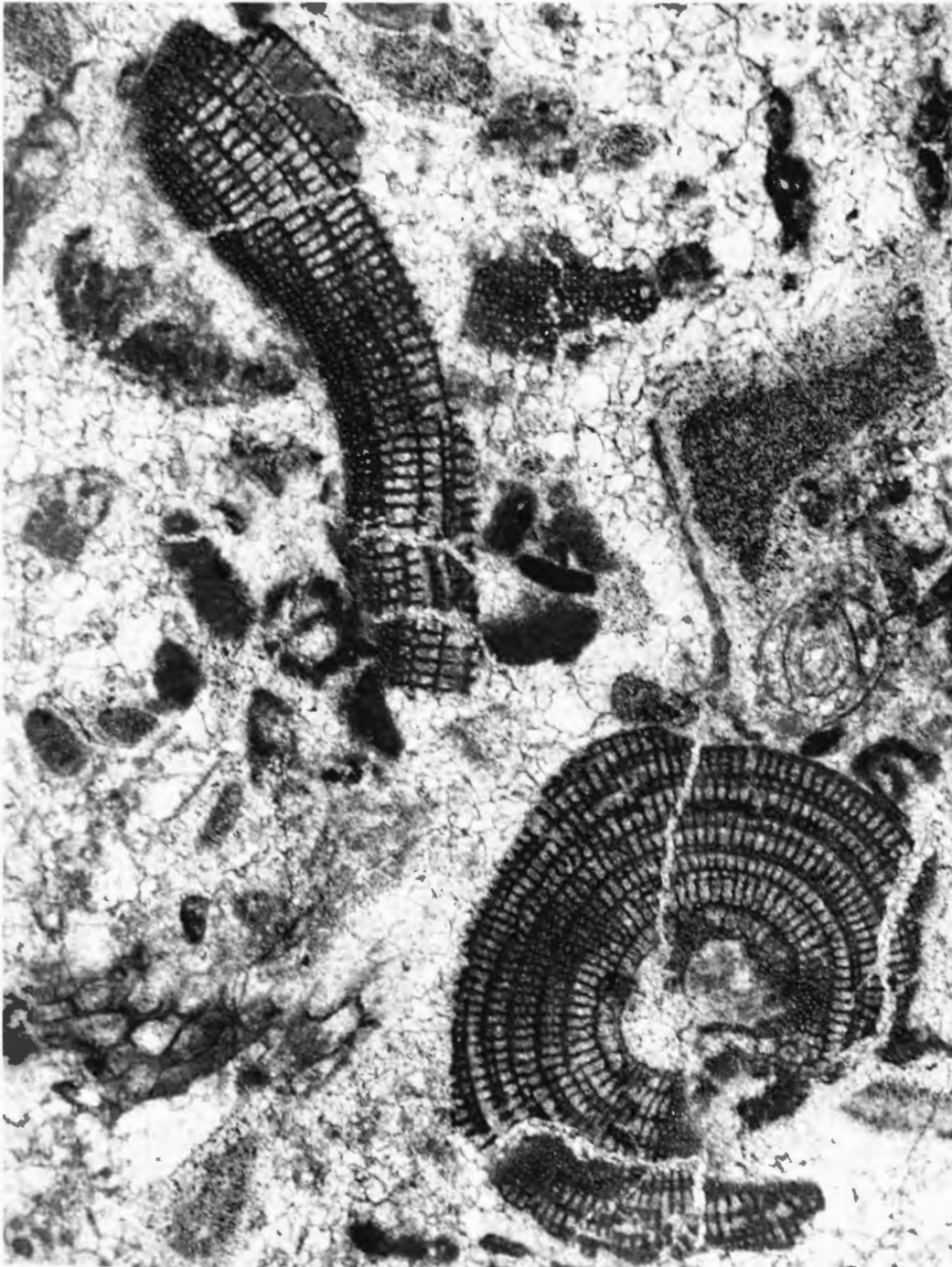
Dicyclina schlumbergeri MUNIER-CHALMAS
(X 10).
SENONIAN of Salento, Apulia, Italy.

NEOCOMIAN								SENONIAN				
BERRIASIAN	VALANGINIAN	HAUTERVIAN						BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN



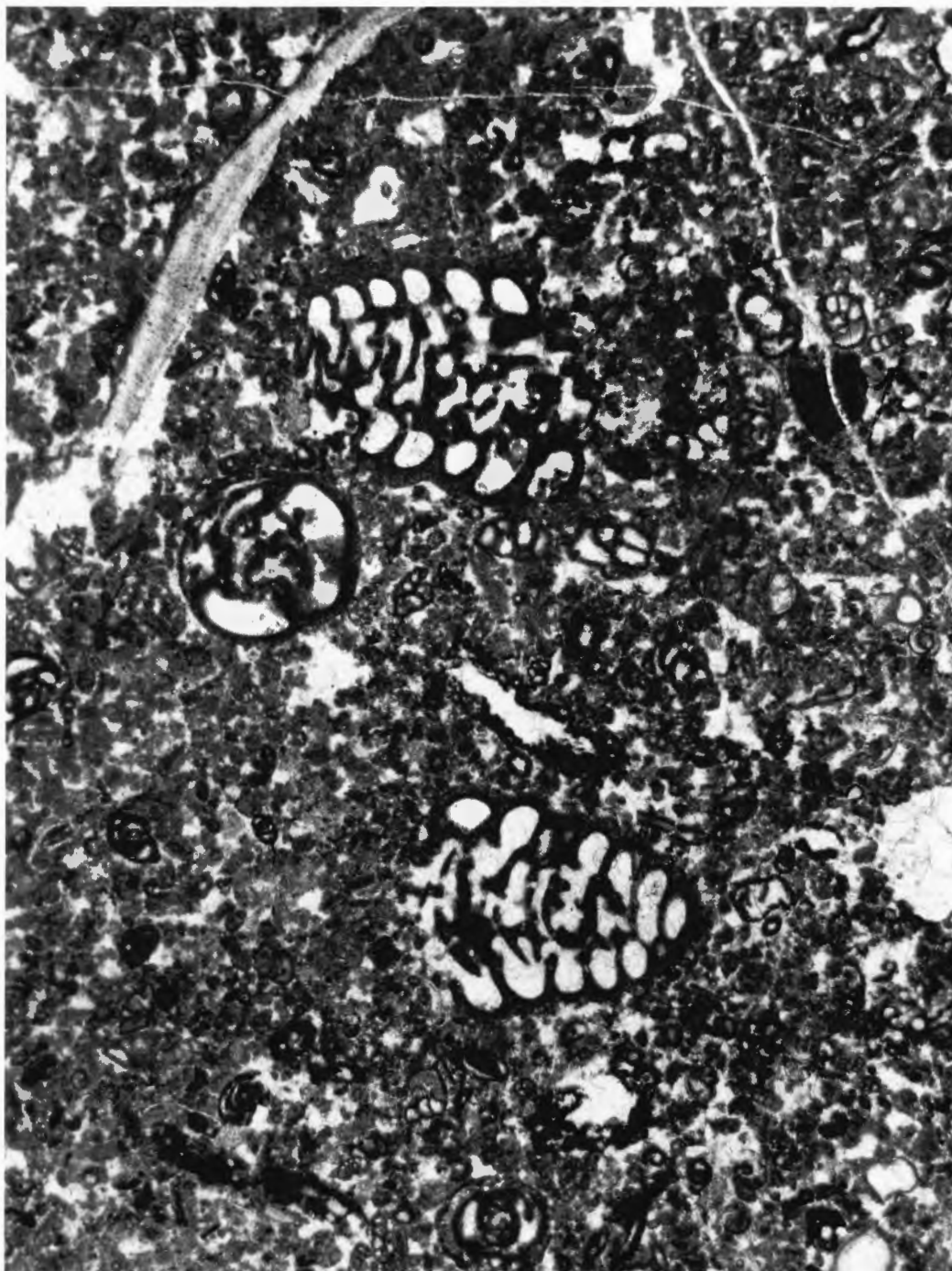
Dicyclina schlumbergeri MUNIER-CHALMAS
(X 20).
LOWER SENONIAN of Cusano Mutri,
Campania, Italy.

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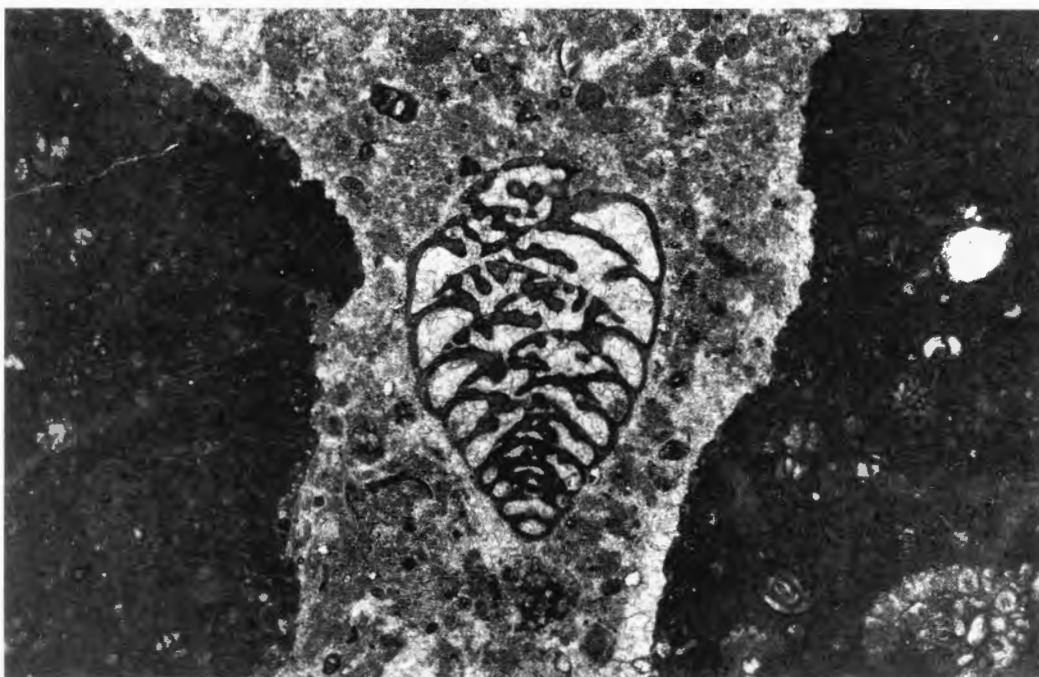
Dicyclina schlumbergeri MUNIER-CHALMAS
(X 40).
UPPER SENONIAN of Central Tunisia.

COLL.: BALDUZZI



Chrysalidina gradata D'ORBIGNY (X 20).
UPPER CENOMANIAN of Cellina Valley,
Friuli, Italy.

NEOCOMIAN								SENONIAN				
BERRIASIAN	VALANGINIAN	HAUTERIVIAN						BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN

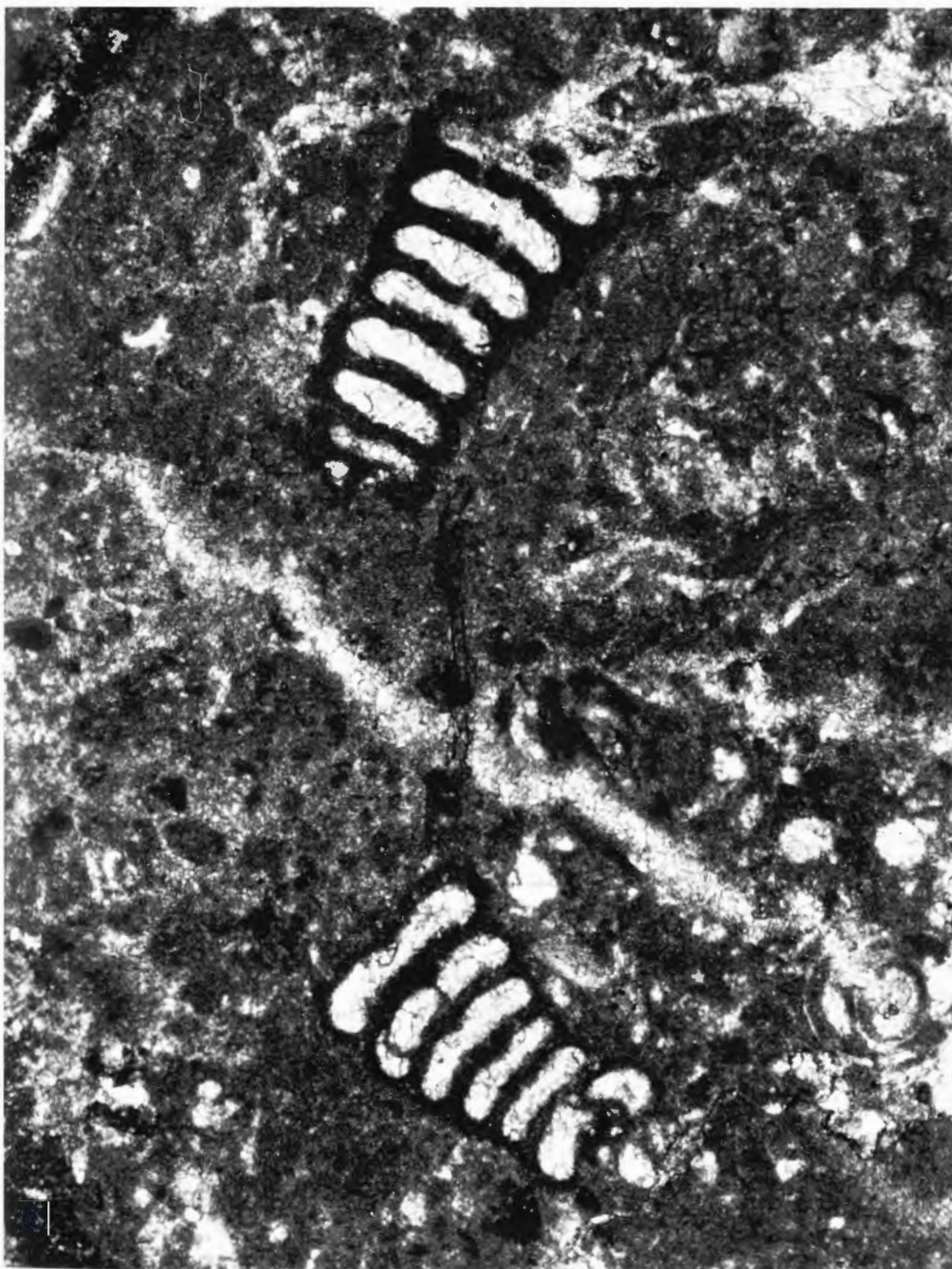


Chrysalidina gradata D'ORBIGNY (X 30).
MIDDLE CENOMANIAN of Ras Fartaq,
P.D.R. of Yemen.



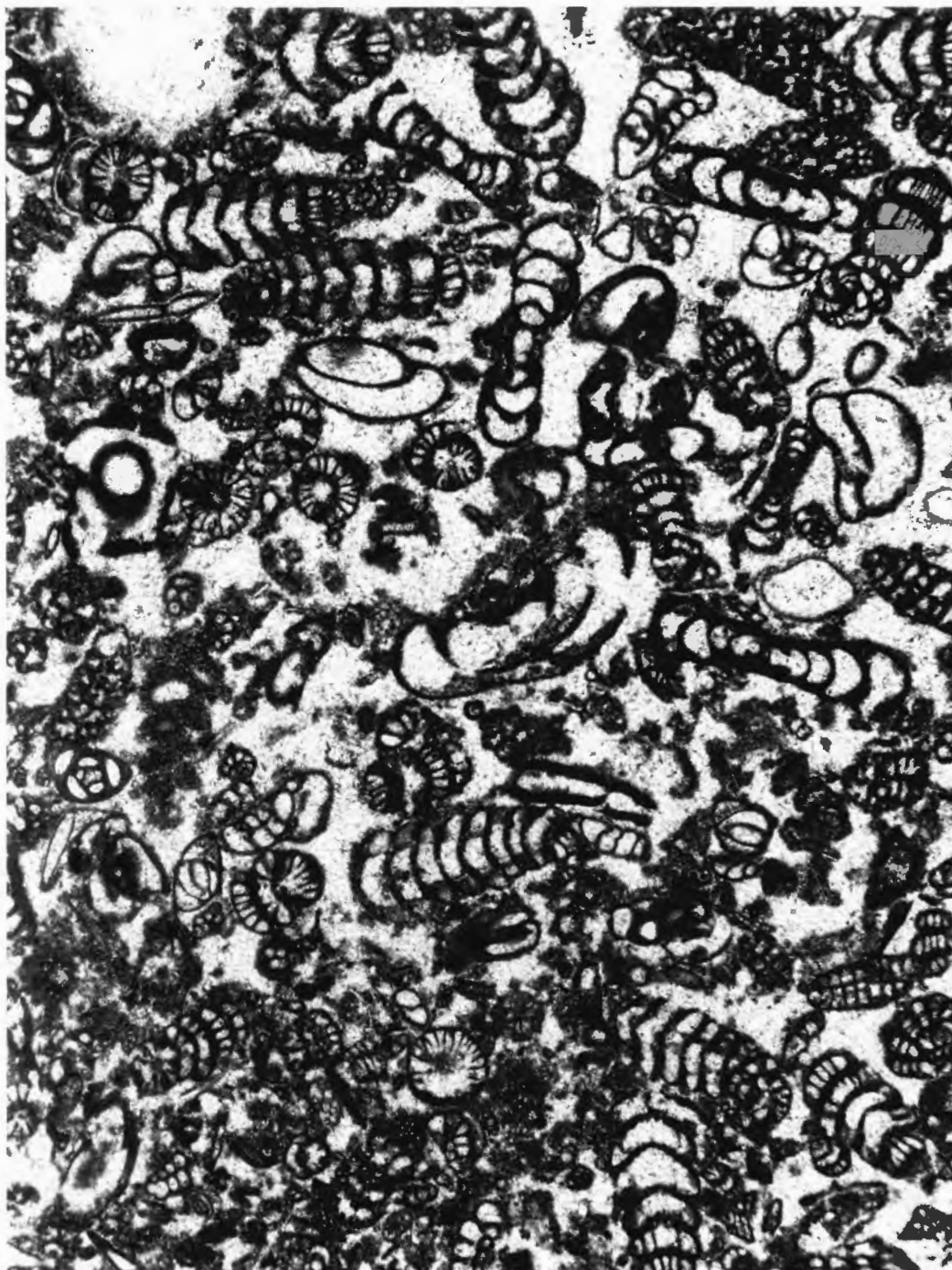
COLL.: DE CASTRO, INST. OF PALEONT. UNIV. OF NAPLES

Pseudolituonella reicheli MARIE (X 25).
UPPER CENOMANIAN of Campana 1
well, Calabria, Italy.



Pseudolituonella reicheli MARIE and
Cisalveolina fraasi (GÜMBEL) (X 60).
UPPER CENOMANIAN of Tang-e-Zar,
Zagros, Iran.

NEOCOMIAN					SENONIAN						
BERRIASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN	CAMPANIAN	MAASTRICHTIAN



COLL.: DE CASTRO, INST. OF PALEONT. UNIV. OF NAPLES

Pseudorhapydionina laurinensis (DE CASTRO). *Aeolisaccus*, *Cuneolina pavonia* D'ORBIGNY, *Nezzazzatidae* and *Miliolidae* are present (X 15). Detail (X 30). UPPER CENOMANIAN of Sacco, Campania, Italy.

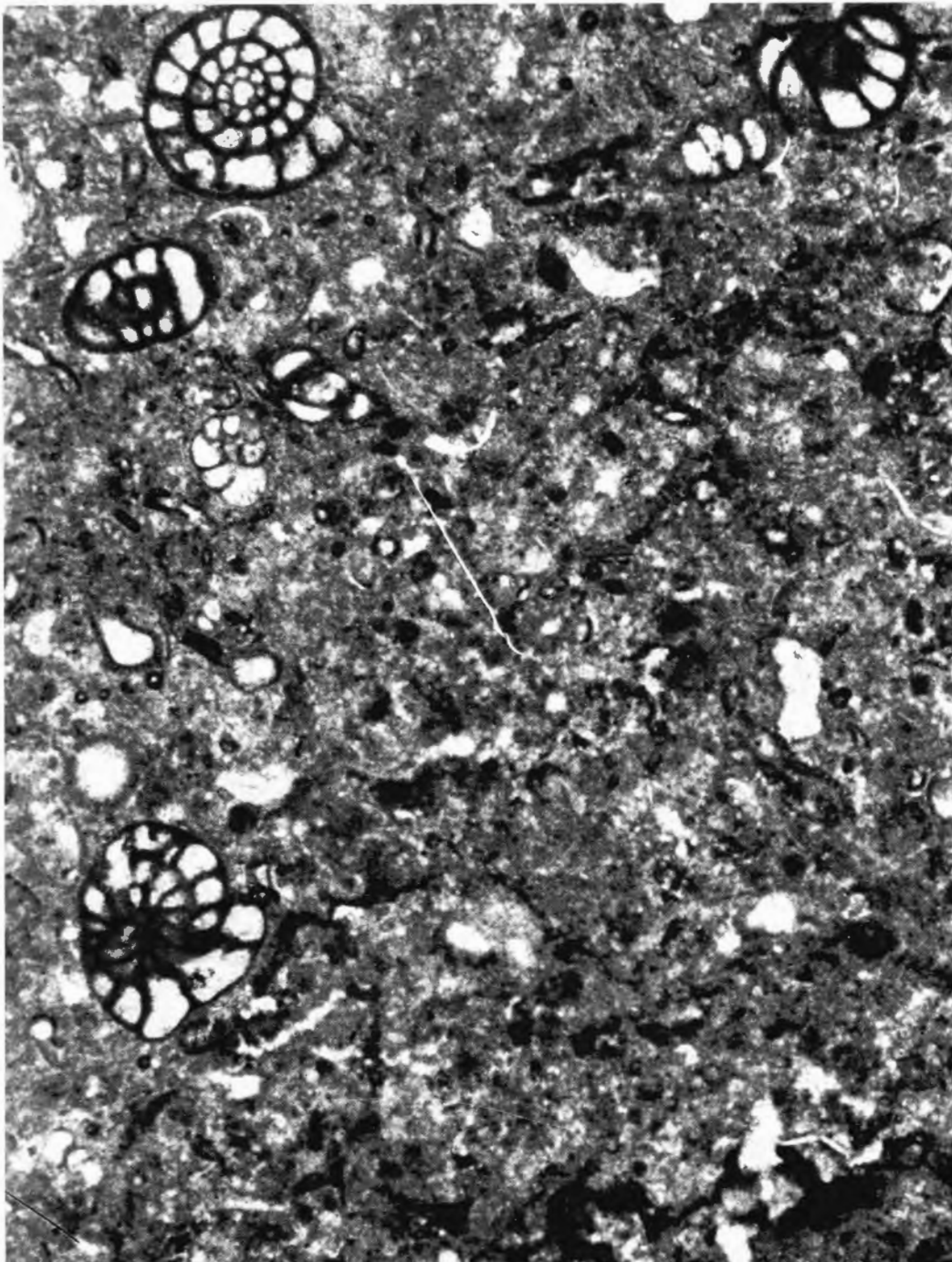
NEOCOMIAN			SENONIAN							
BERRIASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN	MAASTRICHTIAN



COLL.: DE CASTRO, INST. OF PALEONT. UNIV. OF NAPLES

Pseudorhapydionina dubia (DE CASTRO). *Aeolisaccus*, *Nezzazzatidae*, *Miliolidae*, and *Textulariidae* are present (X 40). UPPER CENOMANIAN of Caserta, Campania, Italy.

NEOCOMIAN			SENONIAN							
BERRIASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN	MAASTRICHTIAN



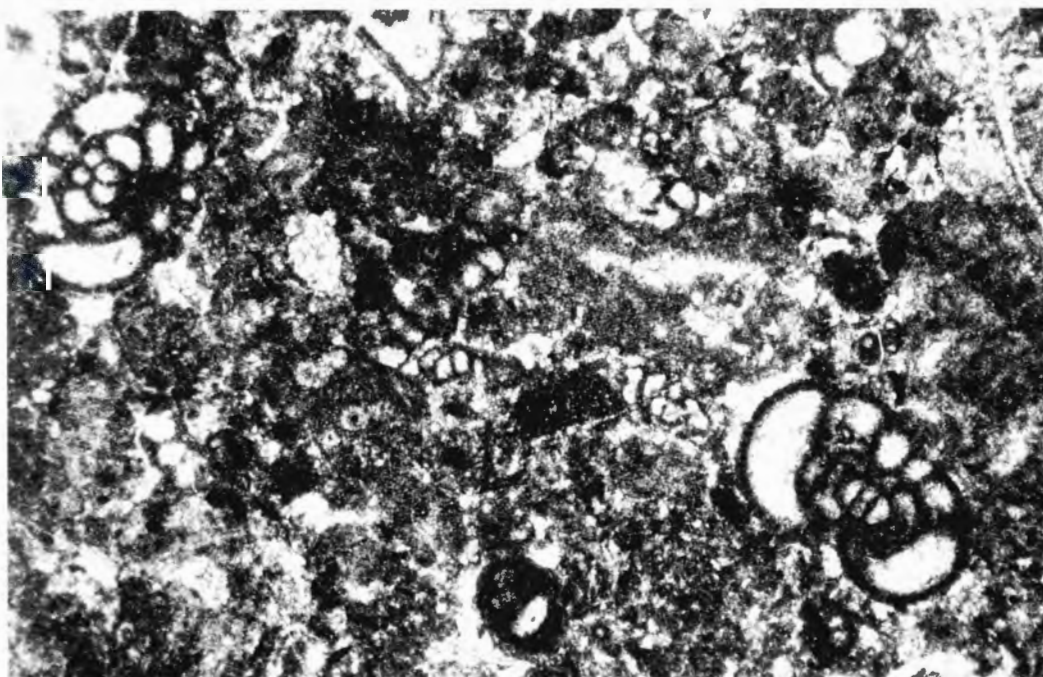
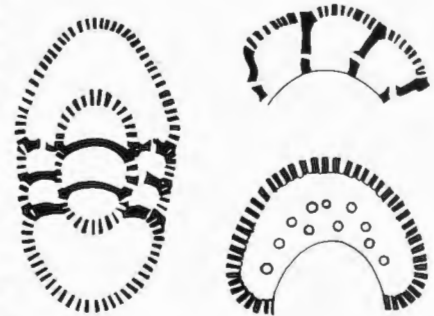
COLL.: DE CASTRO, INST. OF PALEONT. UNIV. OF NAPLES

Montcharmontia apenninica (DE CASTRO)
(X 50).

LOWER SENONIAN of Salerno,
Campania, Italy.

Detail with wall structures from
DE CASTRO 1967 (X 140).

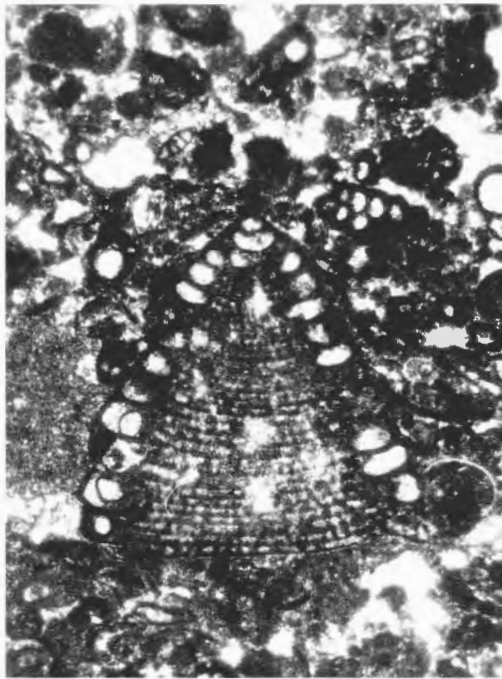
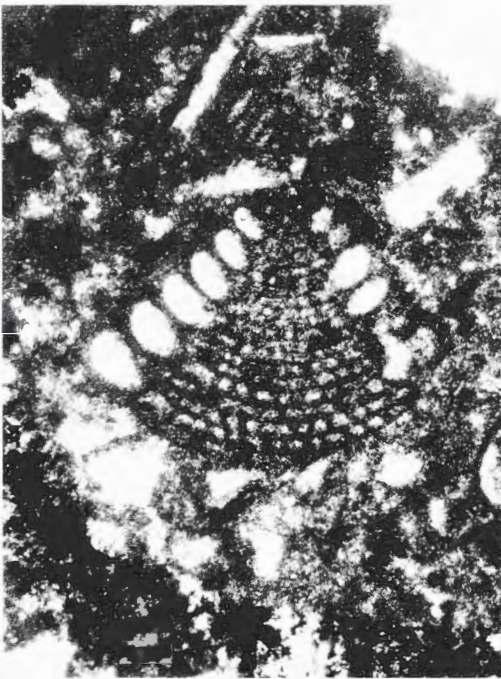
NEOCOMIAN					SENONIAN				
BERRIASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN
									CAMPANIAN
									MAASTRICHTIAN



COLL.: BALDUZZI

Montcharmontia apenninica (DE CASTRO)
(X 70).

LOWER SENONIAN of Salerno,
Campania, Italy.



Accordiella conica FARINACCI. (X 40) (left).
LOWER SENONIAN of Poggiardo, Apulia,
Italy.

Accordiella conica FARINACCI (X 35) (right).
LOWER SENONIAN of Cicerale 1 dir. well,
Campania, Italy.

NEOCOMIAN								SENONIAN			
BERRIASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN	CAMPANIAN	MAASTRICHTIAN



Keramosphaerina tergestina (STACHE).
Accordiella conica FARINACCI is present
(X 10).
SANTONIAN of Prosecco, Venetia Julia,
Italy.

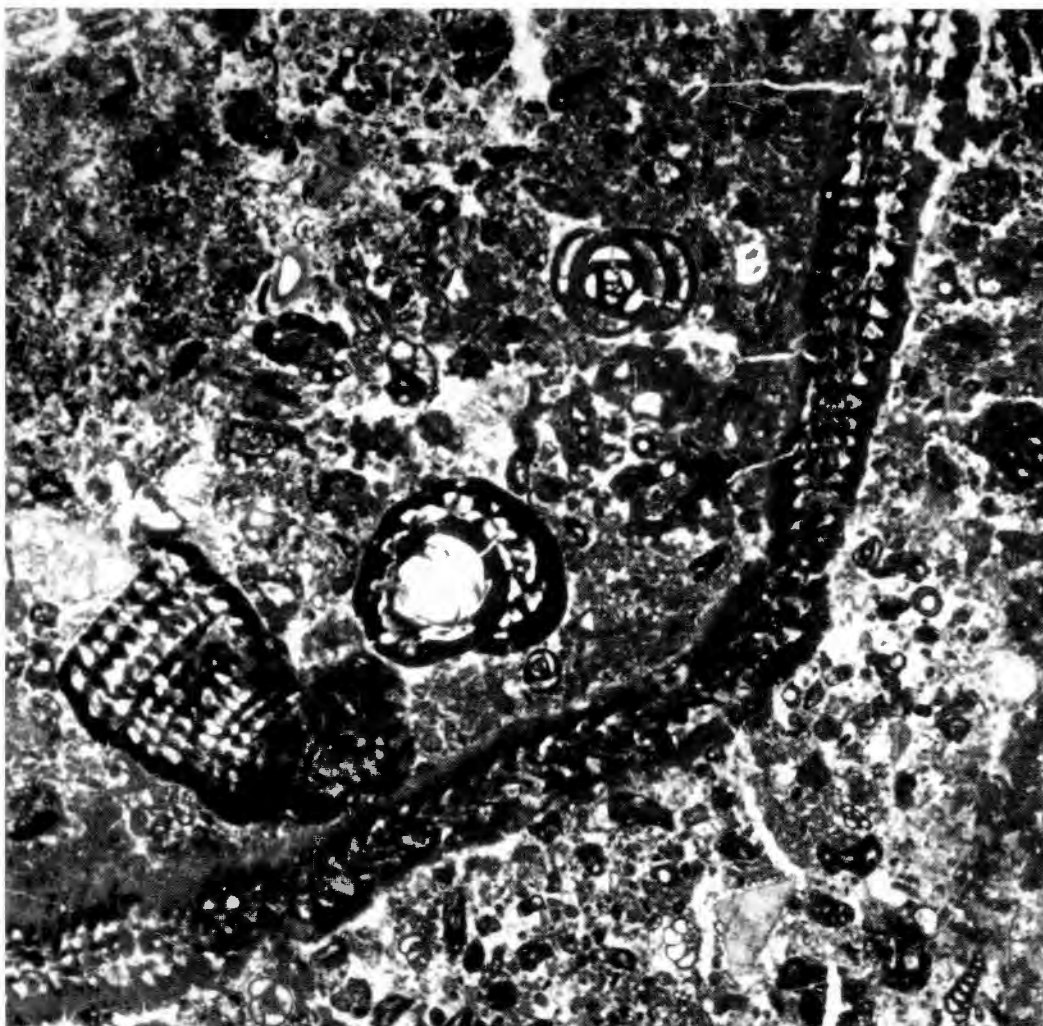
NEOCOMIAN								SENONIAN			
BERRIASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN	CAMPANIAN	MAASTRICHTIAN

Opposite page
Scandonea samnitica DE CASTRO. *Dicyclina schlumbergeri* MUNIER-CHALMAS, *Miliolidae* and *Textulariidae* are present (X 40).
Detail (X 30).
LOWER SENONIAN of Cusano Mutri,
Campania, Italy.

NEOCOMIAN								SENONIAN			
BERRIASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN	CAMPANIAN	MAASTRICHTIAN







COLL.: DE CASTRO, INST. OF PALEONT. UNIV. OF NAPLES

NEOCOMIAN			BARENNAN	APTIAN	ALBIAN	CECUMIAN	TUFONIAN	SENONIAN			
BERRISAN	VALANGNIAN	HAUTERIVIAN						CONIACIAN	SANTONIAN	CAMPANIAN	MAASTRICHTIAN



Murgella lata (LUPERTO-SINNI) (X 20).
SANTONIAN of Laterza, Apulia, Italy.



COLL.: DE CASTRO, INST. OF PALEONT. UNIV. OF NAPLES



Raadshoovenia salentina (PAPETTI & TEDESCHI). *Miliolidae* and *Cuneolina* are present (X 30). Detail (X 30). CAMPANIAN of Poggiardo, Apulia, Italy.

NEOCOMIAN					SENONIAN				
BERRIUSIAN	VALANGINIAN	HAUTERVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN
									CAMPANIAN
									MAASTRICHTIAN





Loftusia. *Rotaliidae* and *Miliolidae* are present (X 10). MAASTRICHTIAN of Parnezam, Zagros, Iran.

NEOCOMIAN								SENONIAN			
BERRIASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN	CAMPANIAN	MAASTRICHTIAN

Loftusia is very common in the Middle East.



Rotalia skourensis PFENDER. *Orbitoididae*, and *Loftusia* are present (X 20). MAASTRICHTIAN of Ras Sharwayn, P.D.R. of Yemen.

NEOCOMIAN								SENONIAN			
BERRIASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN	CAMPANIAN	MAASTRICHTIAN

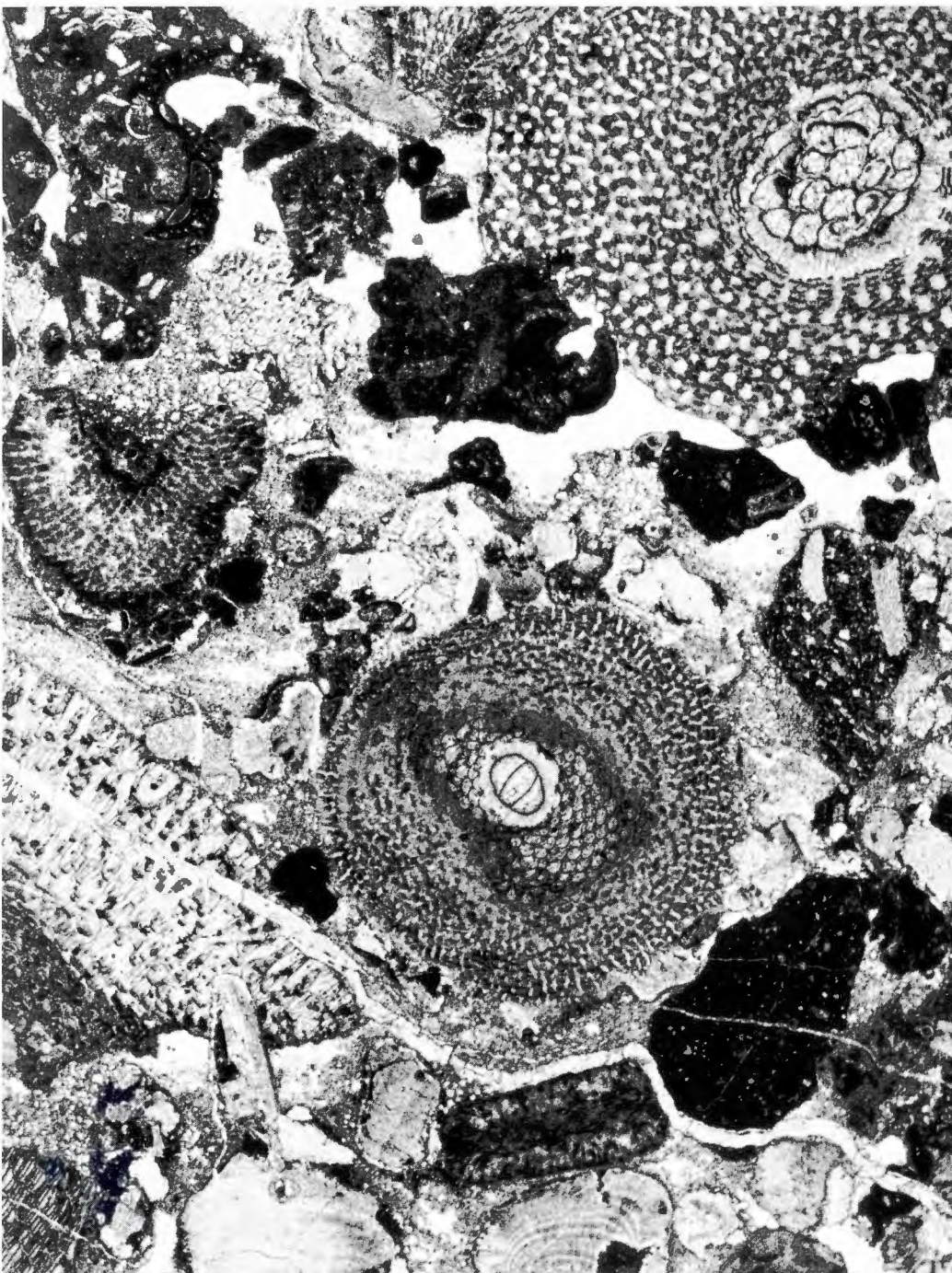
The genus *Rotalia* already present in the EARLY SENONIAN shows a marked differentiation during the MAASTRICHTIAN.



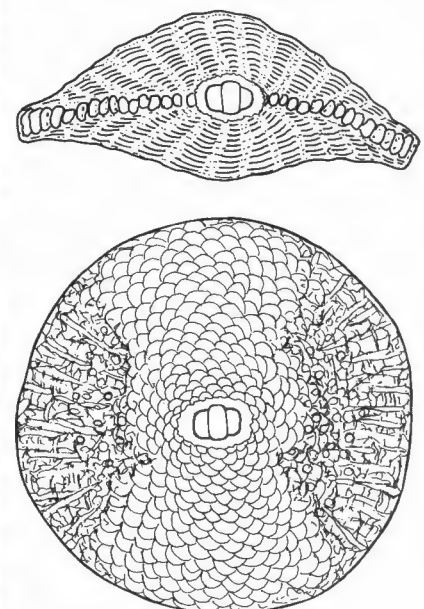
Orbitoides (X 30).
MAASTRICHTIAN of Gianna 2 well,
Adriatic Sea.

NEOCOMIAN				SENONIAN						
BERRIASIAN	VALANGINIAN	HAUTERVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TUROMAN	CONIACIAN	SANTONIAN	CAMPANIAN
										MAASTRICHTIAN

Orbitoides is very common during and at the end of the MAASTRICHTIAN.



Orbitoides, *Siderollites calcitrapoides*
LAMARCK, rudist and echinoid fragments,
algae (X 25).
MAASTRICHTIAN of Termini Imerese,
Sicily, Italy.



General features of *Orbitoides*: vertical section
(above) (X 20) and equatorial section showing
arcuate equatorial chambers (below) (X 20).

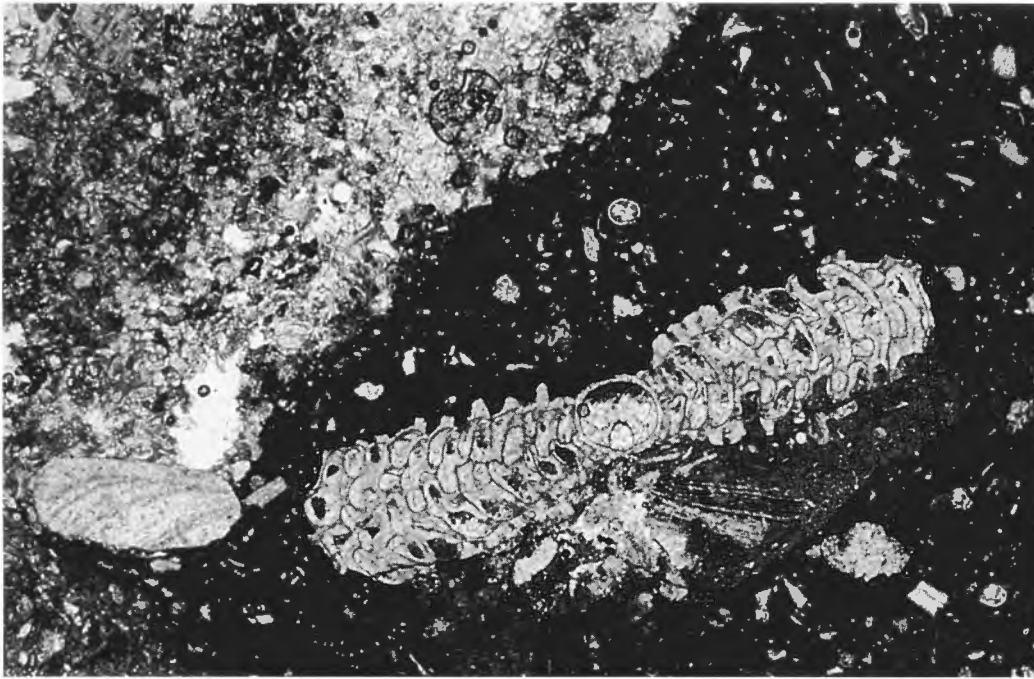


Orbitoides, *Omphalocyclus macroporus* (LAMARCK) and rudist fragments (X 16). MAASTRICHTIAN of Emilio 5 well, Adriatic Sea.

Opposite page
Lepidorbitoides. *Orbitoides*, *Siderolites calcitrapoides* LAMARCK, *Pseudedomia* and *Rotaliidae* are present (X 20). MAASTRICHTIAN of Ras Fartaq, P.D.R. of Yemen.

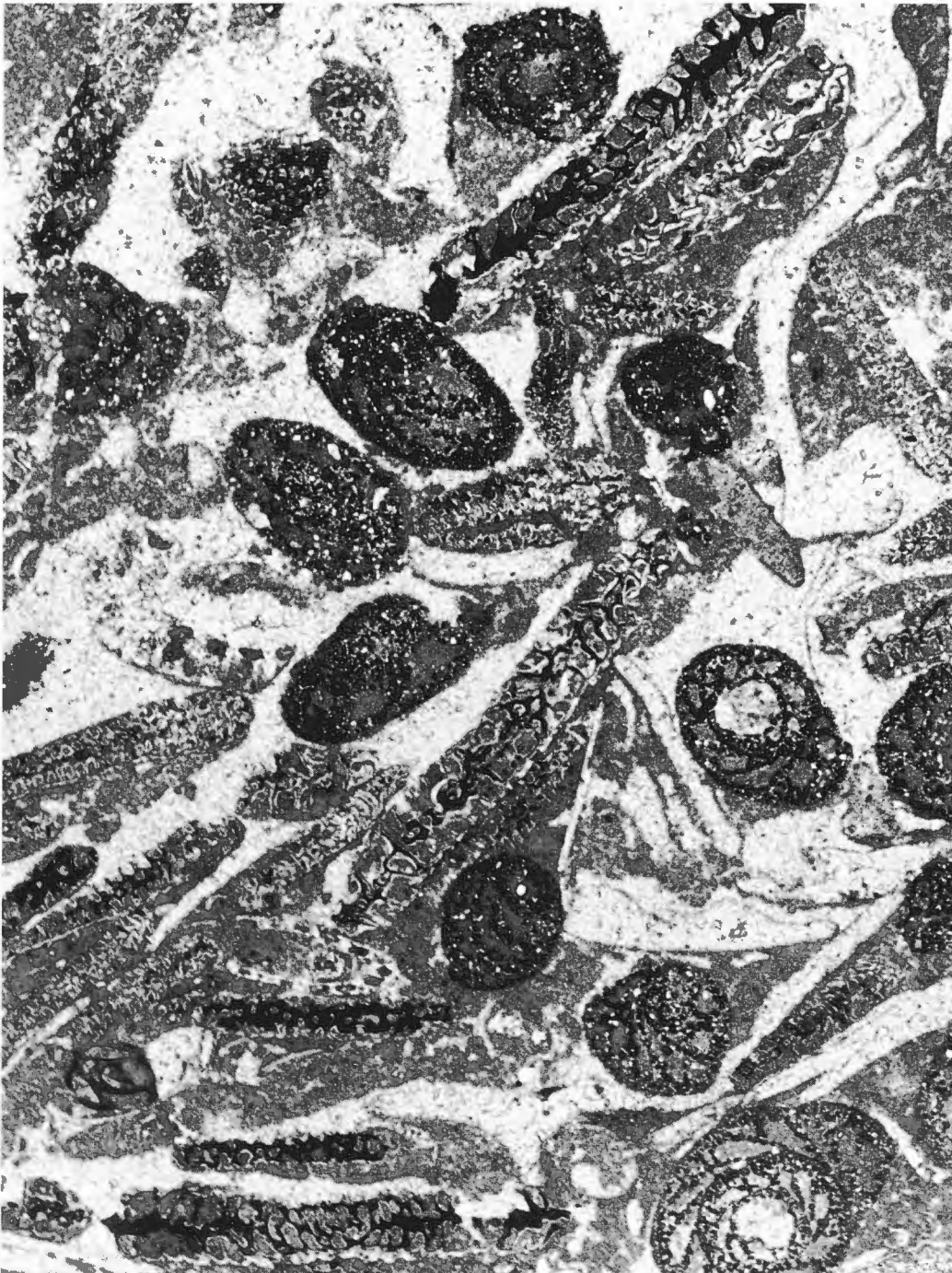
NEOCOMIAN				SENONIAN			
BERRIASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN
						CONIACIAN	SANTONIAN
						CAMPANIAN	MAASTRICHTIAN



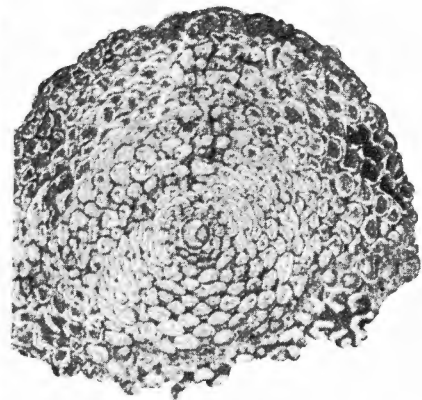


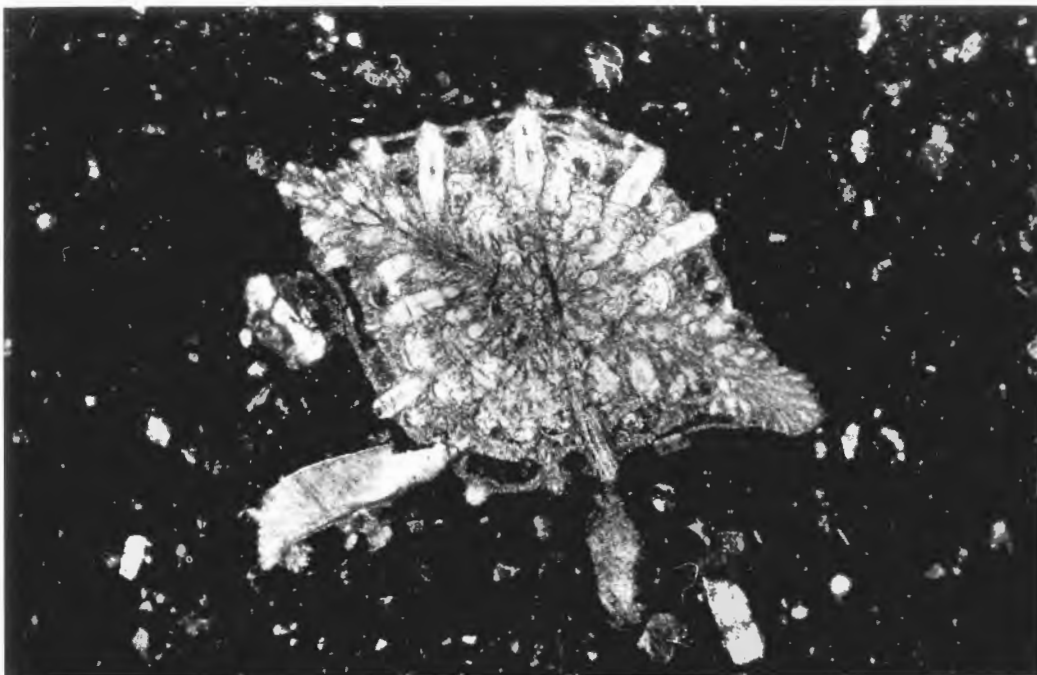
Omphalocyclus macroporus (LAMARCK)
(X 20).
MAASTRICHTIAN of Emilio 5 well, Adriatic
Sea.

NEOCOMIAN			SENONIAN							
BERRIASIAN	VALANGINIAN	HAUTERVIAN	BAREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN	CAMPANIAN
										MAASTRICHTIAN



Omphalocyclus macroporus (LAMARCK) and
Loftusia (X 18). Detail of the equatorial
section of *Omphalocyclus* (X 18).
MAASTRICHTIAN of Parnezam, Zagros,
Iran.



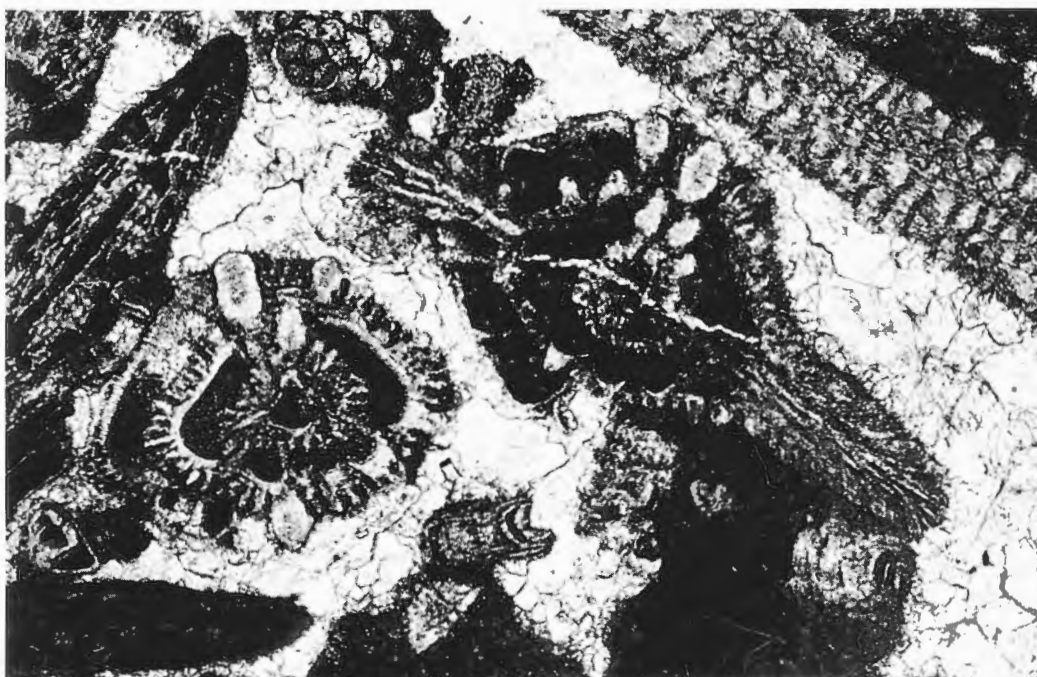


Siderolites calcitrapoides LAMARCK (X 20).
MAASTRICHTIAN of Madonna della Croce
2 well, Abruzzo, Italy.

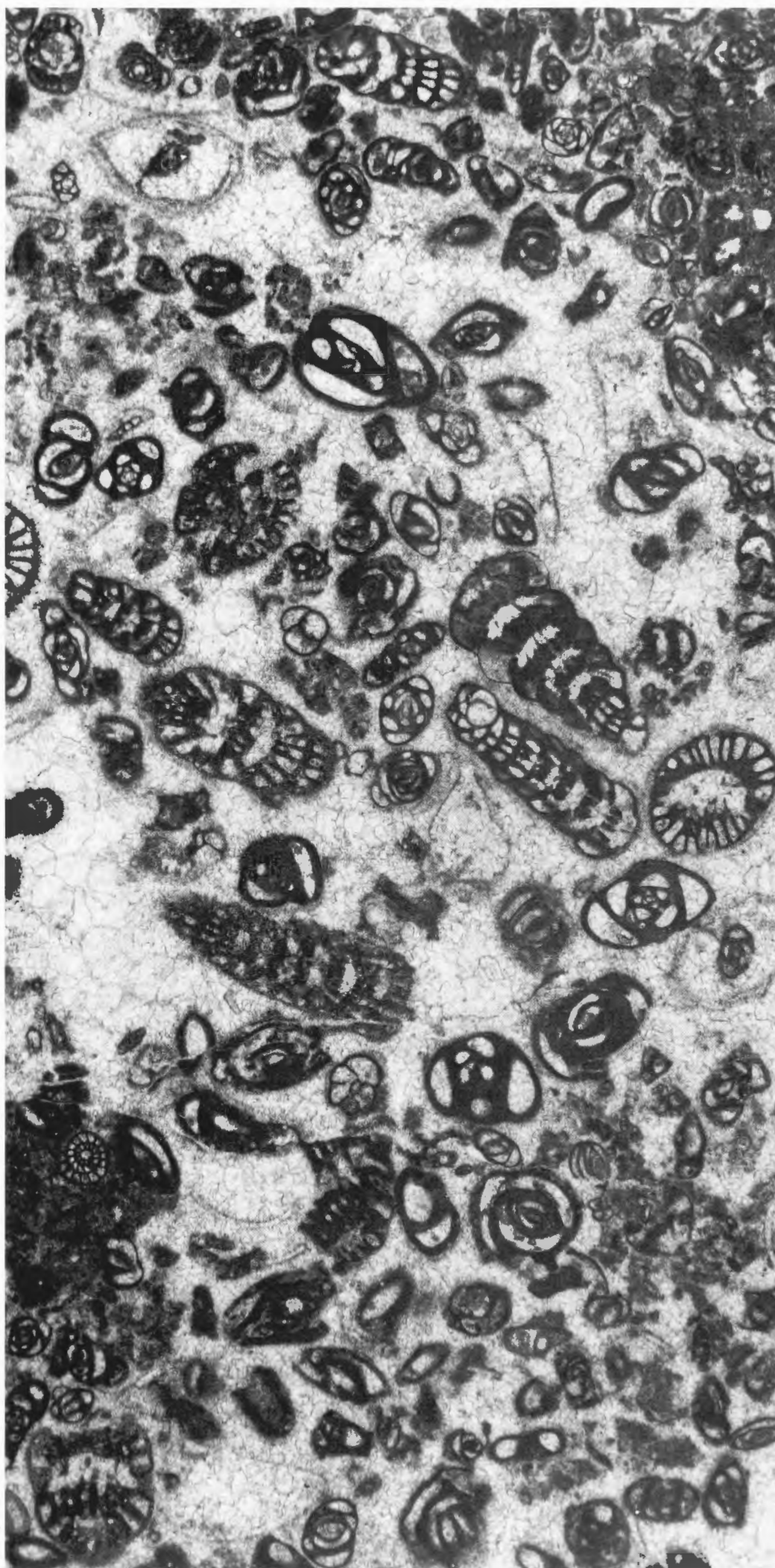
NEOCOMIAN				SENONIAN				
BERRASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TUROMAN	CONIACIAN
								SANTONIAN
								CAMPANIAN
								MAASTRICHTIAN



Siderolites calcitrapoides LAMARCK (X 25).
MAASTRICHTIAN of Termini Imerese,
Sicily, Italy.

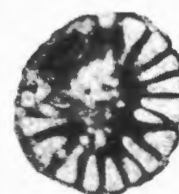


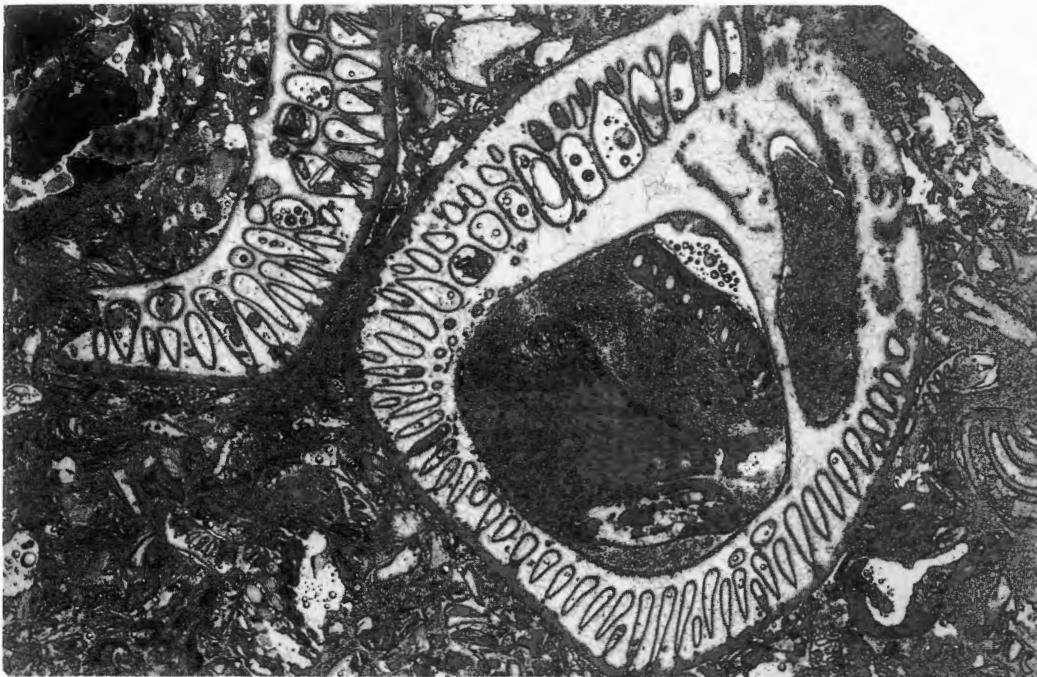
Siderolites calcitrapoides LAMARCK,
Orbitoides and *Lepidorbitoides* (X 40).
MAASTRICHTIAN of Ras Fartaq, P.D.R.
of Yemen.



Rhapydionina liburnica (STACHE). *Miliolidae* and *Montcharmontia* are present (X 25). Detail (X 30). MAASTRICHTIAN of Vremski Britof, Yugoslavia.

NEOCOMIAN			SENONIAN								
BERRIASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN	CAMPANIAN	MAASTRICHTIAN

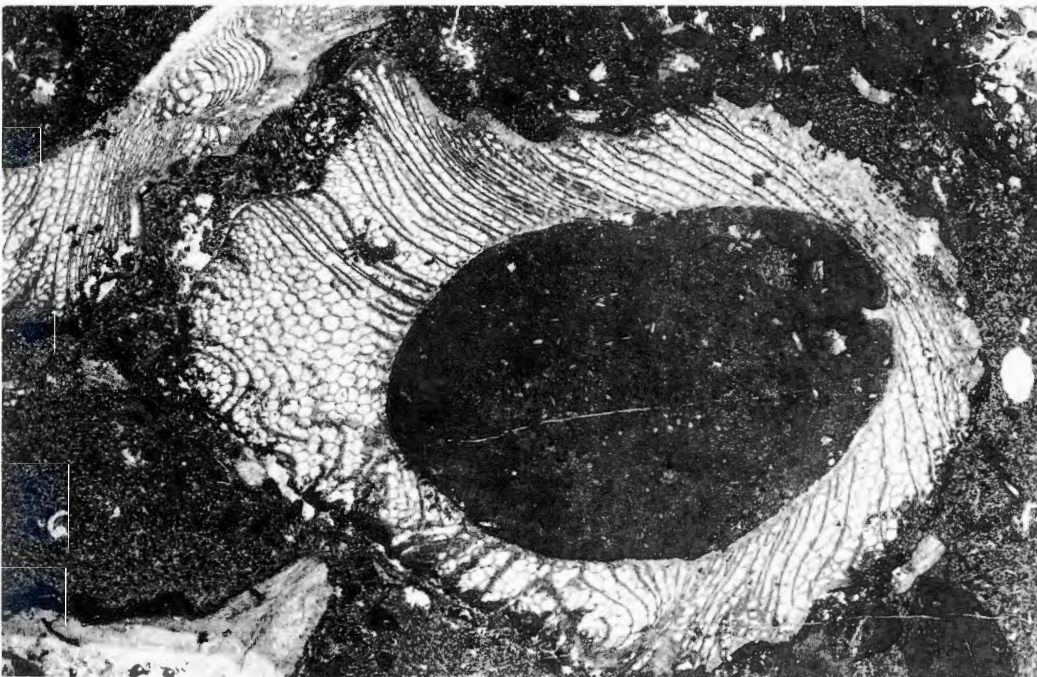




Caprinidae (X 2).
MIDDLE CENOMANIAN of Alpha 1 well,
Iran offshore.

NEOCOMIAN				SENONIAN							
BERRIASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN	CAMPANIAN	MAASTRICHTIAN

This rudist family features shell tests provided with characteristic canals.



Radiolitidae (X 4).
CENOMANIAN of Bagnolo in Piano 1 well,
Emilia, Italy.

NEOCOMIAN								SENONIAN				
BERRIASIAN	VALANGIANIAN	HAUTERIVIAN	BARREMIAN					APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN

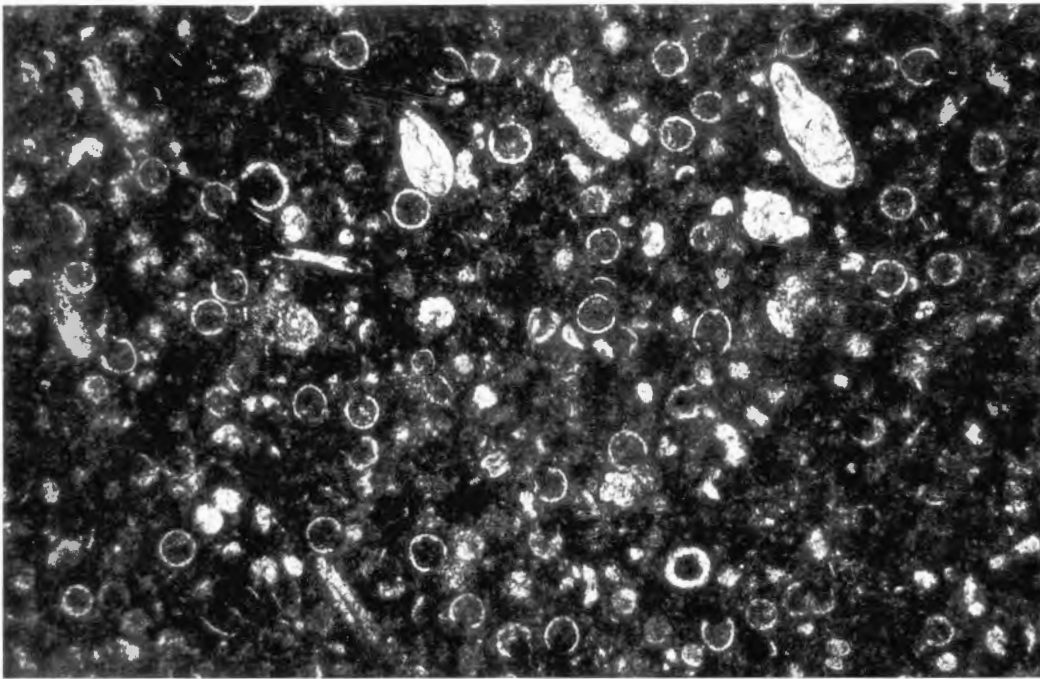
Reticulate test is the diagnostic element that identifies this rudist family.



Hippuritidae (X 6).
MAASTRICHTIAN of Ras Sharwayn,
P.D.R. of Yemen.

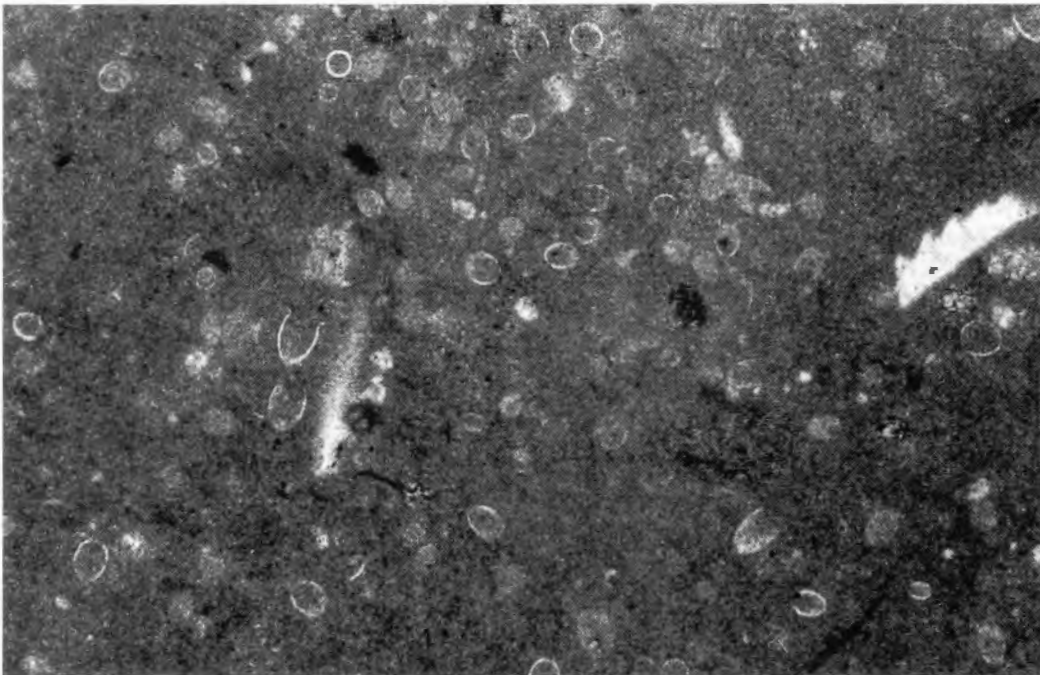
NEOCOMIAN									SENONIAN			
BERRIASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN						APTIAN	ALBIAN	CENOMANIAN	TURONIAN

Pillars are the diagnostic elements of this rudist family.



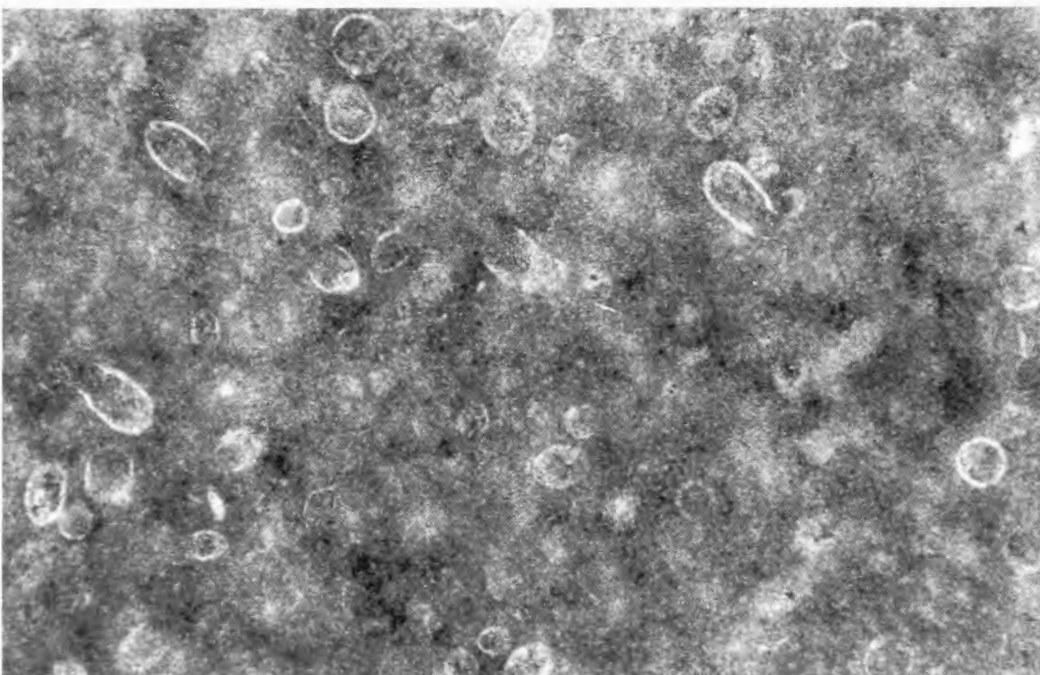
Calpionella alpina LORENZ (X 60). Detail (X 200).
BERRIASIAN of Pizzo Merio, Sicily, Italy.

DOGGER		MALM			NEOCOMIAN					
BATHONIAN	CALLOVIAN	OXFORDIAN	KIMMERIDGIAN	TITHONIAN	BERRIASIAN	VALANGINIAN	HAUTERIVIAN			
								BARREMIAN	APTIAN	ALBIAN



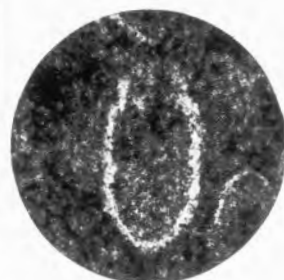
Tintinnopsella carpathica (MURGEANU & FILIPESCU) (X 50). Detail (X 145).
BERRIASIAN of Spormaggiore, Trentino, Italy.

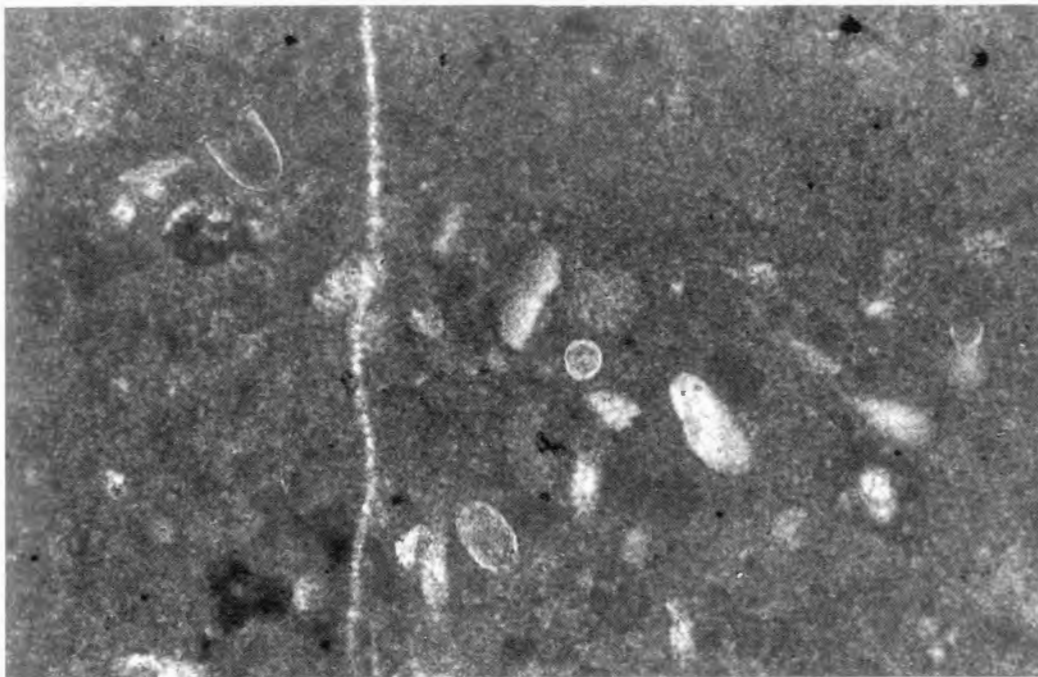
DOGGER		MALM			NEOCOMIAN					
BATHONIAN	CALLOVIAN	OXFORDIAN	KIMMERIDGIAN	TITHONIAN	BERRIASIAN	VALANGINIAN	HAUTERIVIAN			
								BARREMIAN	APTIAN	ALBIAN



Calpionella elliptica CADISCH (X 90). Detail (X 230).
BERRIASIAN of Monte San Simeone, Friuli, Italy.

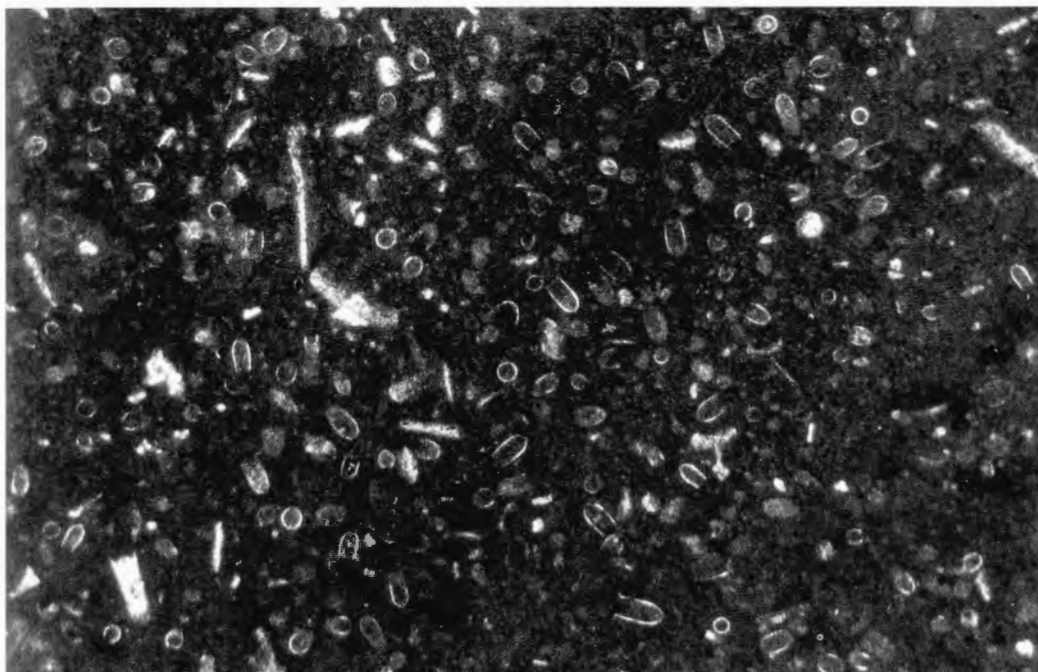
NEOCOMIAN							SENONIAN					
BERRIASIAN	VALANGINIAN	HAUTERIVIAN					BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TUPONIAN	CONIACIAN





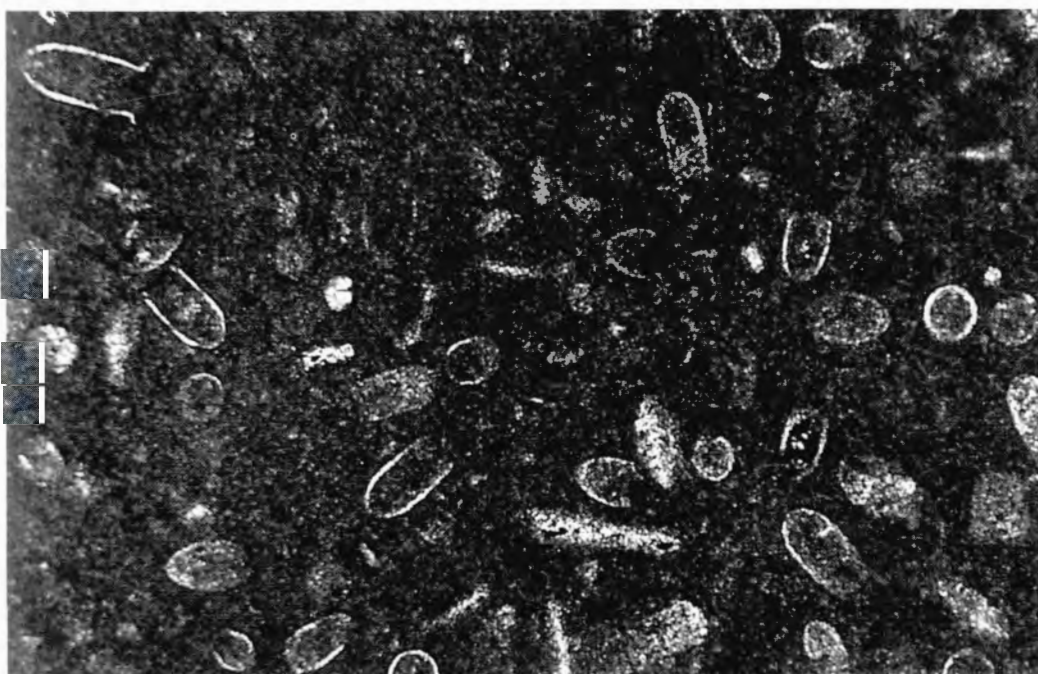
Remaniella cadischiana (COLOM) (X 110).
Detail (X 230).
BERRIASIAN of Monte San Simeone,
Friuli, Italy.

NEOCOMIAN				SENONIAN							
BERRASIAN	VALANGNIAN	HAUTERVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN	CAMPANIAN	MAASTRICHTIAN



Tintinnopsella longa (COLOM).
Calpionellopsis simplex (COLOM) is also
present (X 40). Detail (X 200).
BERRIASIAN of Spormaggiore, Trentino,
Italy.

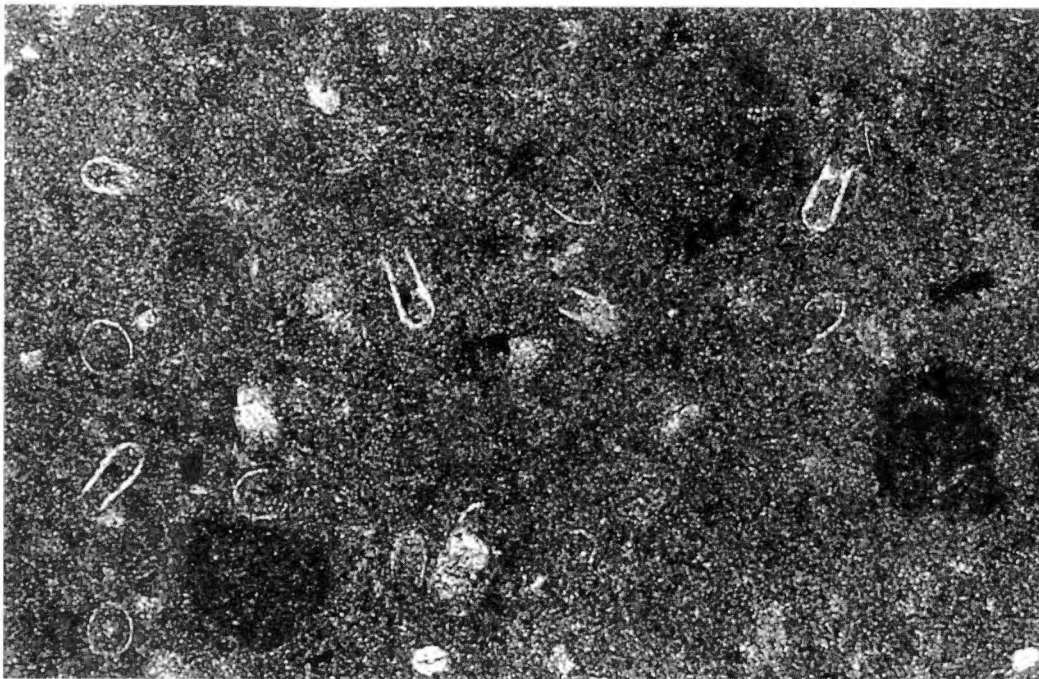
NEOCOMIAN				SENONIAN							
BERRIASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN	CAMPANIAN	MAASTRICHTIAN



Calpionellopsis simplex (COLOM).
Tintinnopsella longa (COLOM) is also
present (X 125). Detail (X 230).
BERRIASIAN of Spormaggiore, Trentino,
Italy.

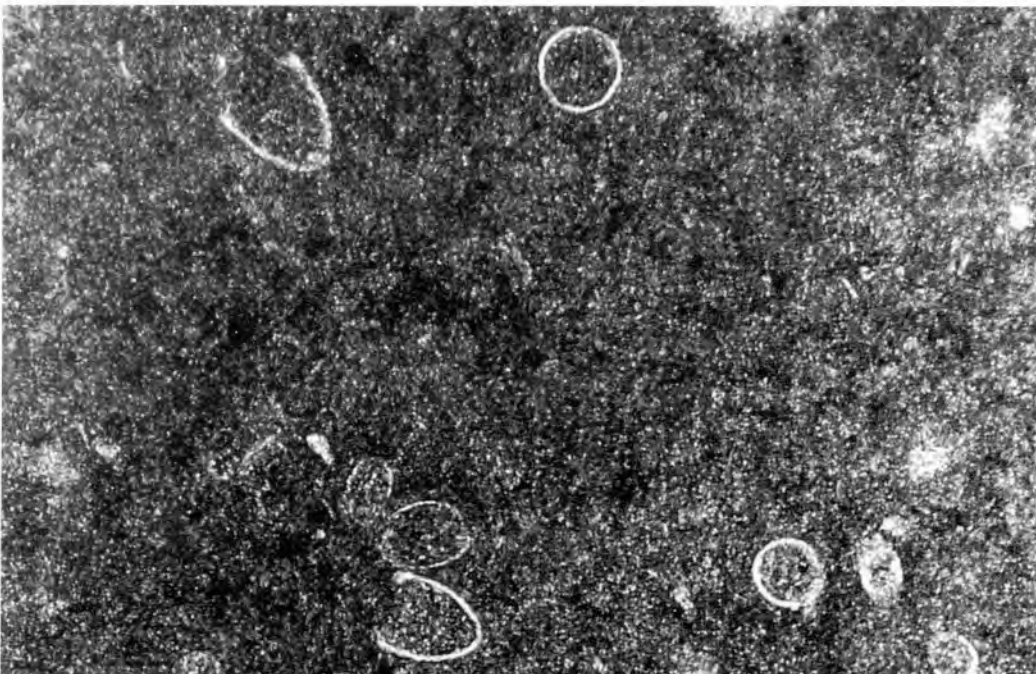
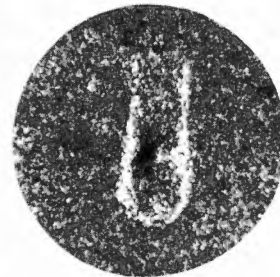
NEOCOMIAN				SENONIAN							
BERRIASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN	CECROMANIAN	TURONIAN	CONIACIAN	SANTONIAN	CAMPANIAN	MAASTRICHTIAN





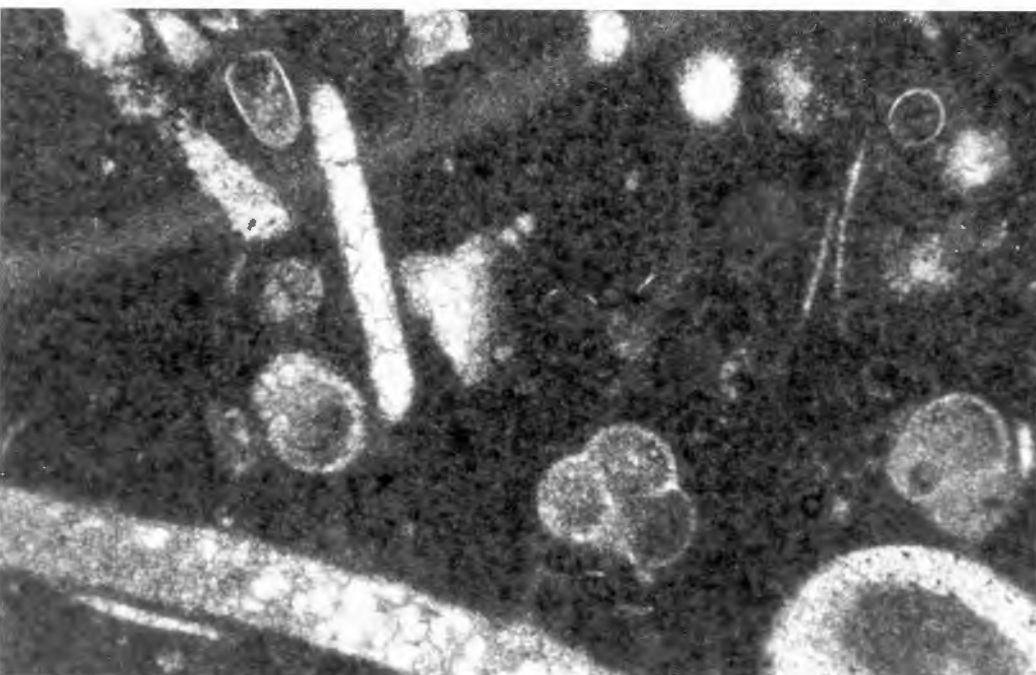
Calpionellopsis oblonga (CADISH) (X 100).
Detail (X 230).
BERRIASIAN of Monte San Simeone,
Friuli, Italy.

NEOCOMIAN				SENONIAN							
BERRIASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN	CAMPANIAN	MAASTRICHTIAN
■											



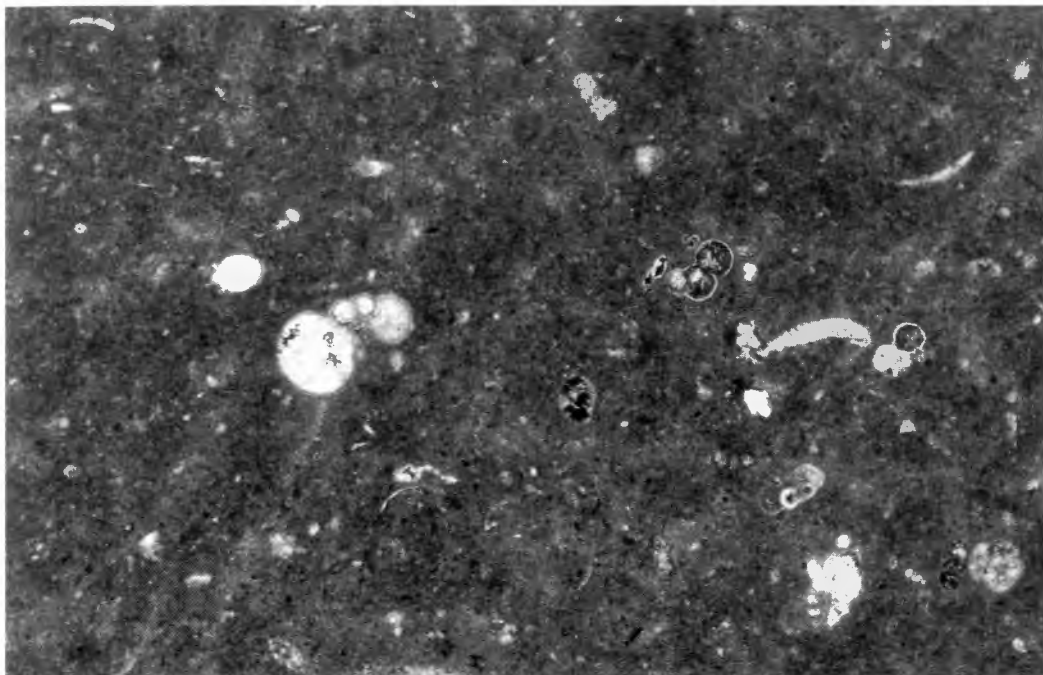
Calpionellites darderi (COLOM) (X 160).
Detail (X 160).
LOWER VALANGINIAN of Pizzo Merio,
Sicily, Italy.

NEOCOMIAN				SENONIAN							
BERRIASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN	CAMPANIAN	MAASTRICHTIAN
■											



Globuligerina and Calpionellids, (X 110).
VALANGINIAN of Monte Bonifato, Sicily,
Italy.

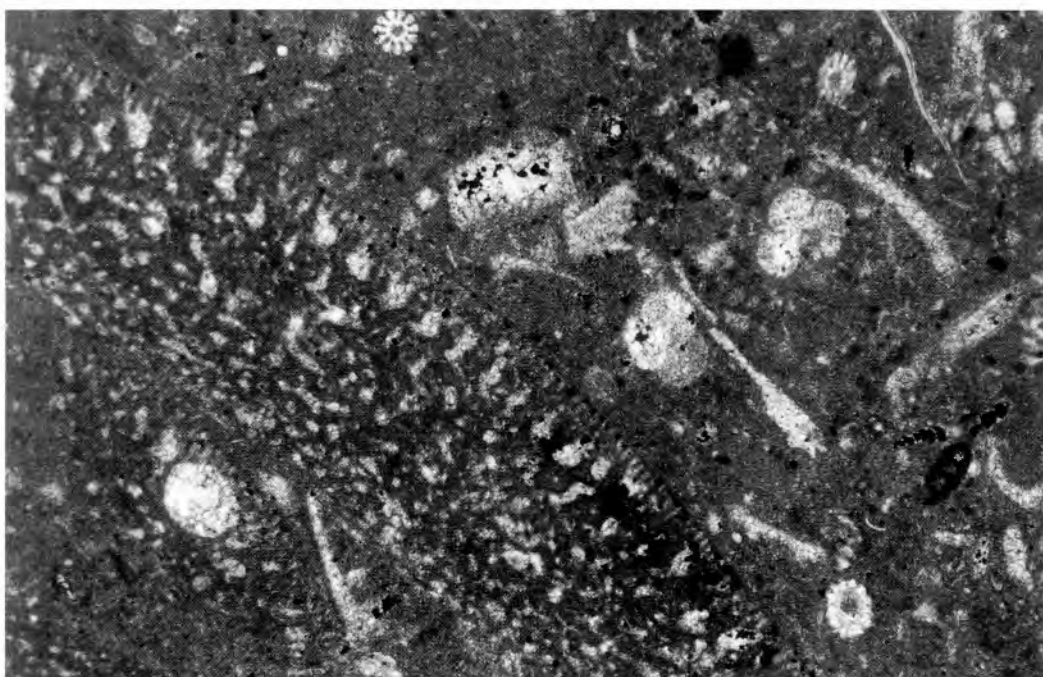
Planktonic foraminifers of NEOCOMIAN age are very rare.



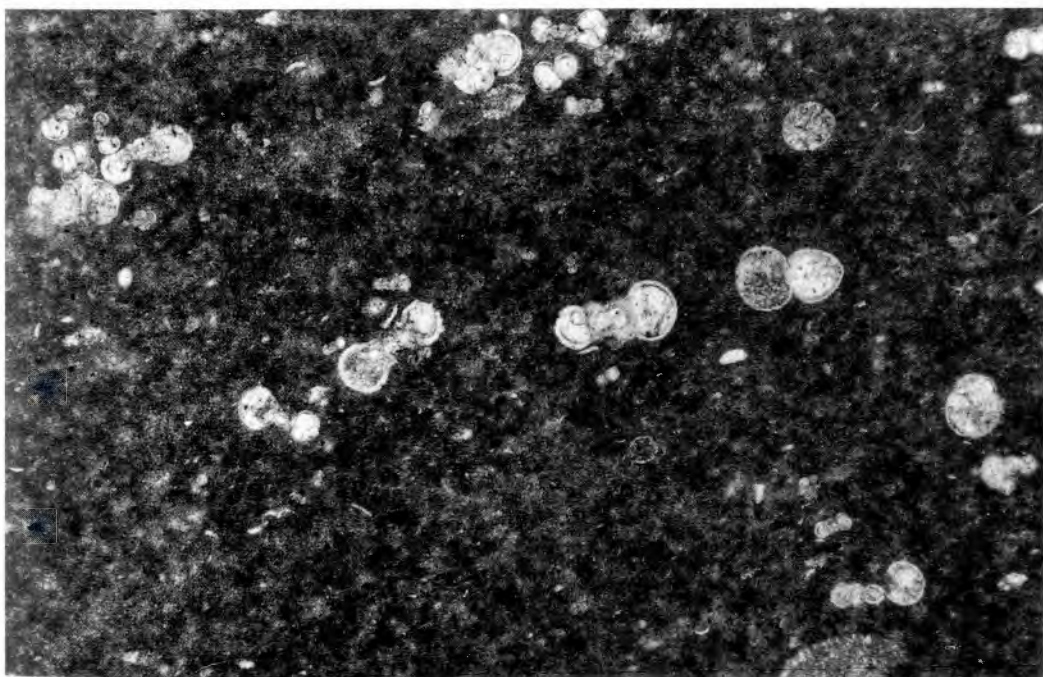
Hedbergella (X 40).
LOWER APTIAN of Ras Sharwayn, P.D.R.
of Yemen.

NEOCOMIAN			SENONIAN								
BERRIASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN	CAMPANIAN	MAASTRICHTIAN

Low trochospiral planktonic foraminifers appear in the
EARLY BARREMIAN.



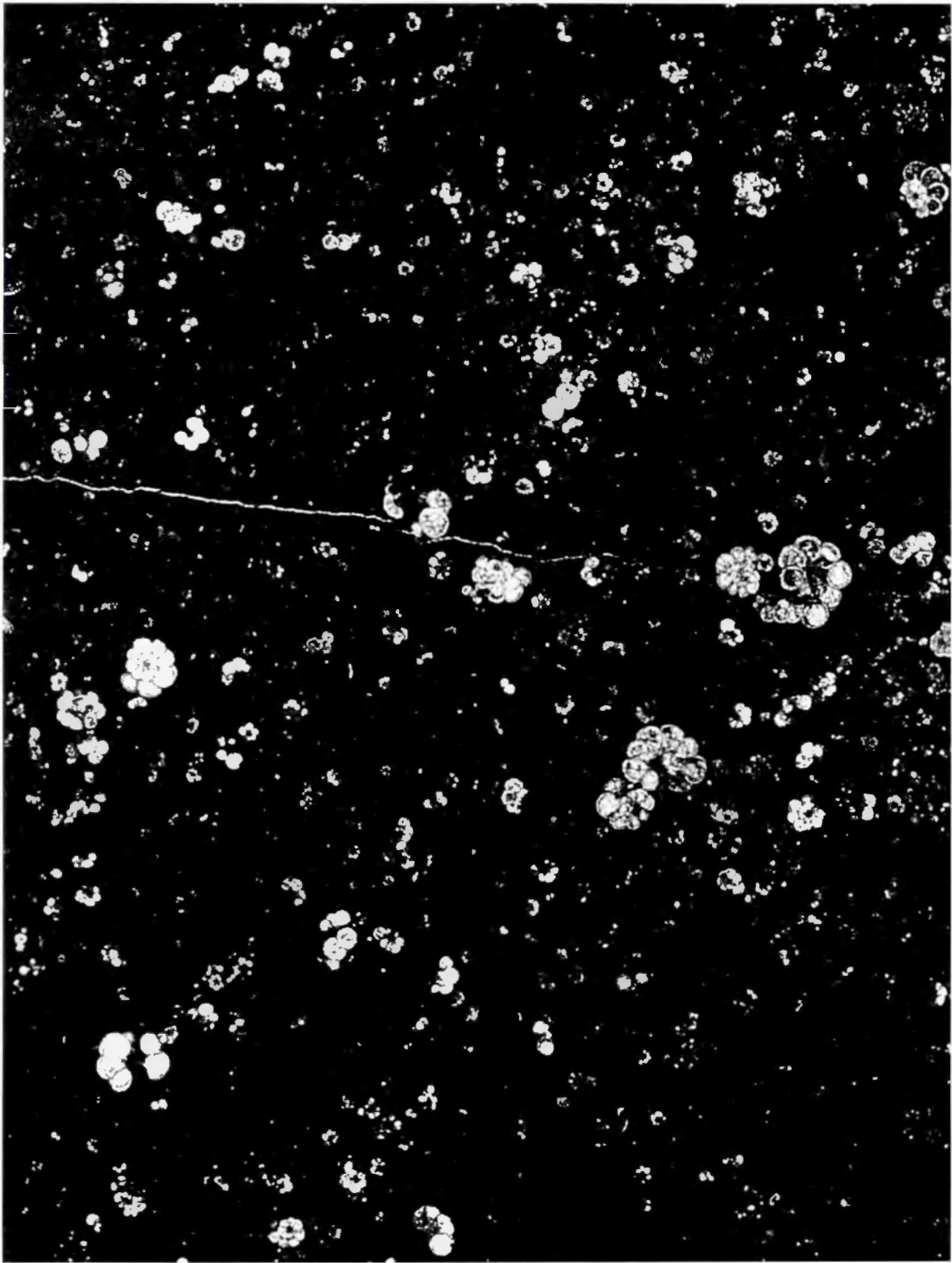
Hedbergella and *Palorbitolina lenticularis*
(BLUMENBACH). (X 35).
LOWER APTIAN of Ras Sharwayn, P.D.R.
of Yemen.



Globigerinelloides (X 50).
ALBIAN of Gubbio, Umbria, Italy.

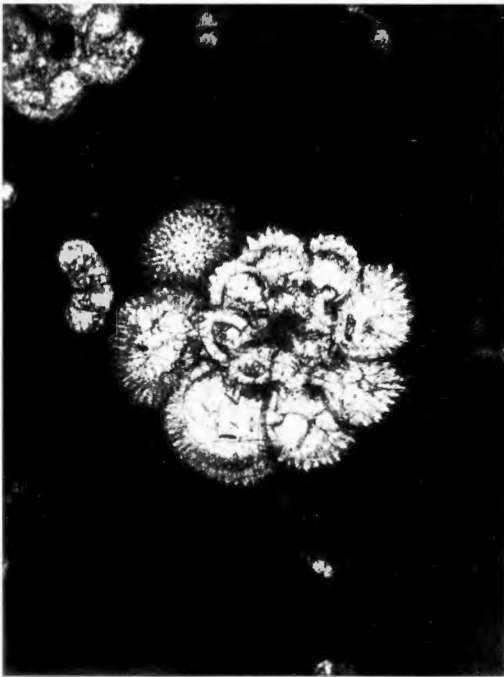
NEOCOMIAN			SENONIAN								
BERRIASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN	CAMPANIAN	MAASTRICHTIAN

Planispiral planktonic foraminifers appear in the
EARLY APTIAN.

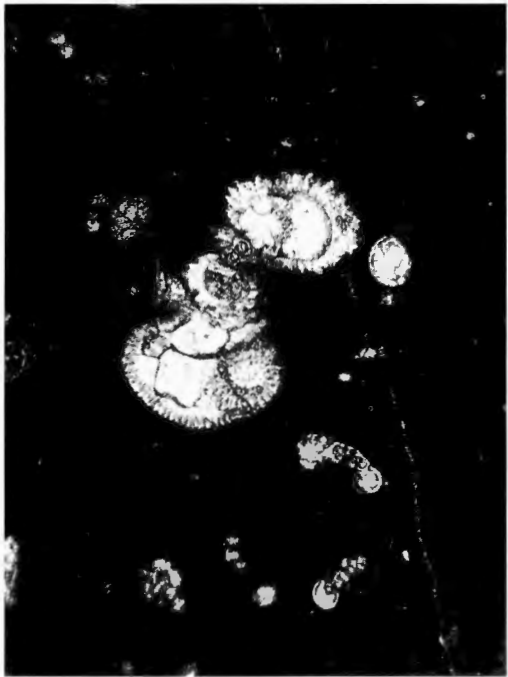


Ticinella. *Hedbergella* is also present (X 35).
ALBIAN of Gubbio, Umbria, Italy.

Ticinella differs from *Hedbergella* owing to the presence of supplementary umbilical apertures: therefore in thin-section a distinction is not always easy.

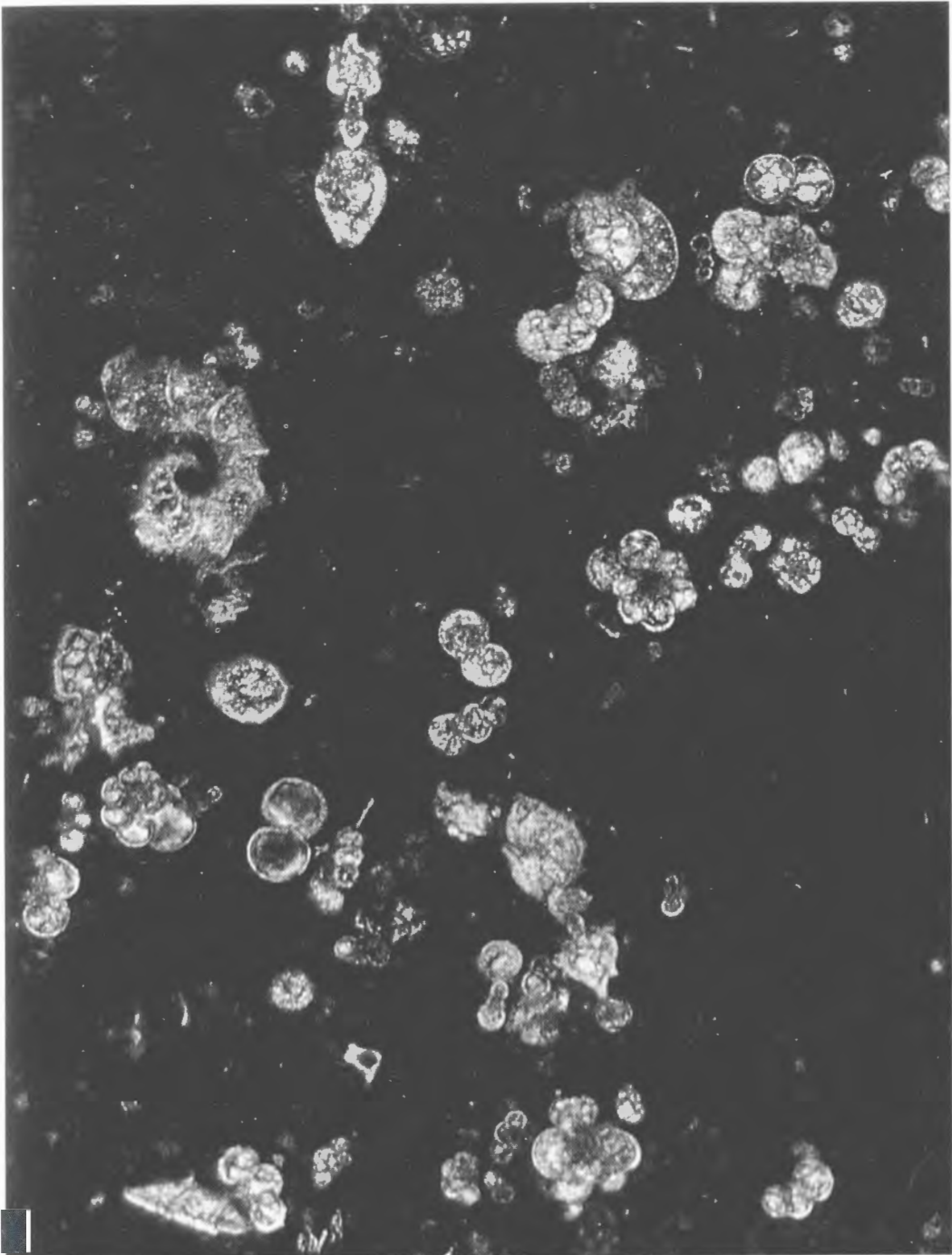


Ticinella (X 170) (left).
ALBIAN of Gubbio, Umbria, Italy.

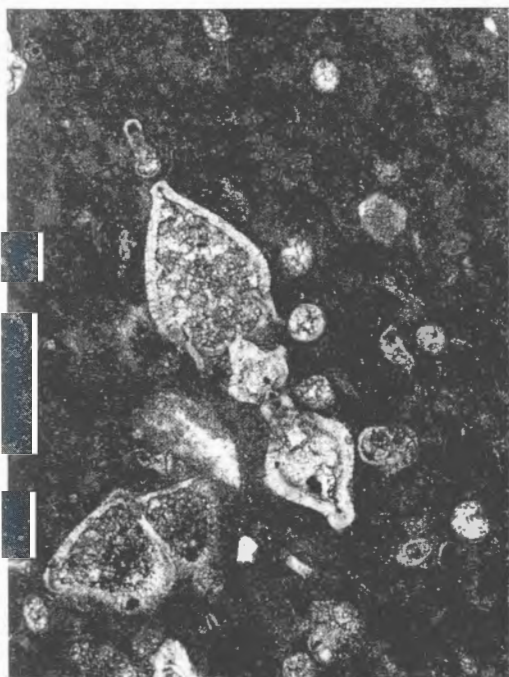


Ticinella (X 170) (right).
ALBIAN of Gubbio, Umbria, Italy.

NEOCOMIAN						SENONIAN			
BERRIASIAN	VALANGINIAN	HAUTERVIAN	BARREMIAN	APTIAN	ALBIAN	CEZOMANIAN	TUPONIAN	CONIACIAN	SANTONIAN
								CAMPANIAN	MAASTRICHTIAN



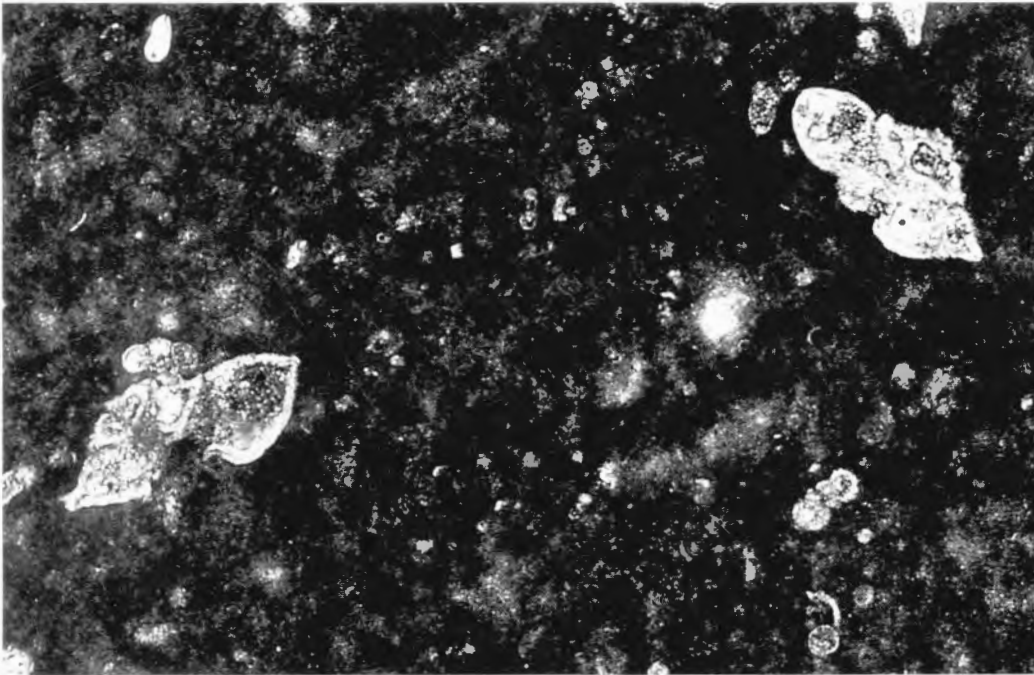
Planomalina buxtorfi (GANDOLFI), *Ticinella*, *Hedbergella* and *Globigerinelloides* (X 75).
UPPERMOST ALBIAN of Valdorbis, Umbria, Italy.



Planomalina buxtorfi (GANDOLFI) (X 100) (left).
UPPERMOST ALBIAN of Bovolone 1 well, Venetia, Italy.

Planomalina buxtorfi (GANDOLFI) (X 100) (right).
UPPERMOST ALBIAN of Bovolone 1 well, Venetia, Italy.

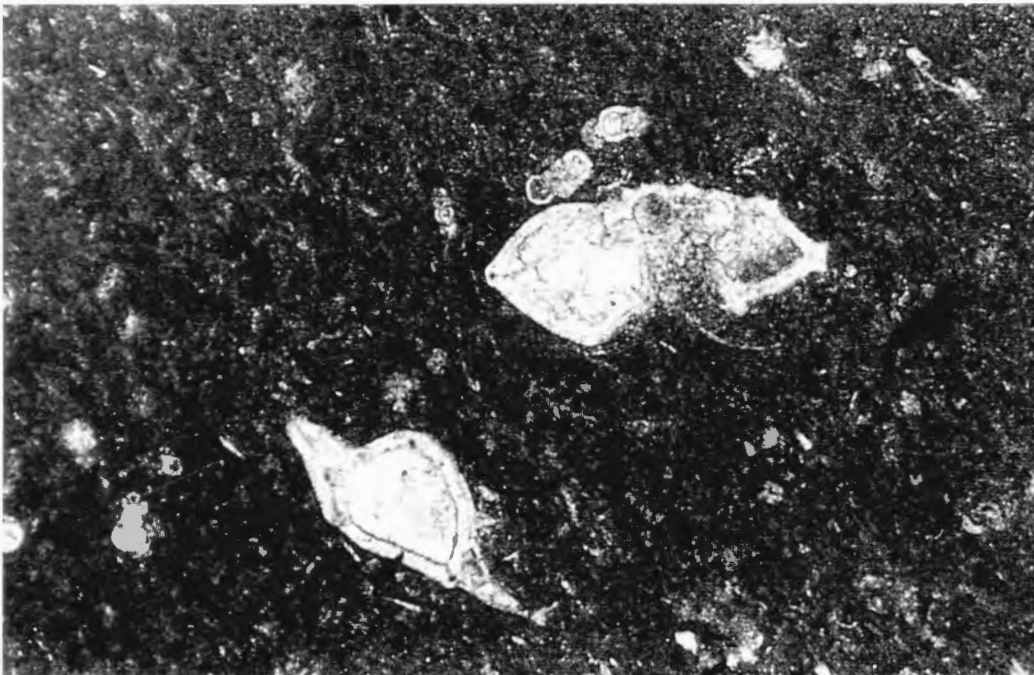
NEOCOMIAN					SENONIAN				
BERRIASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN
									CAMPANIAN
									MAASTRICHTIAN



Rotalipora (X 65).
UPPER ALBIAN of Bovolone 1 well,
Venetia, Italy.

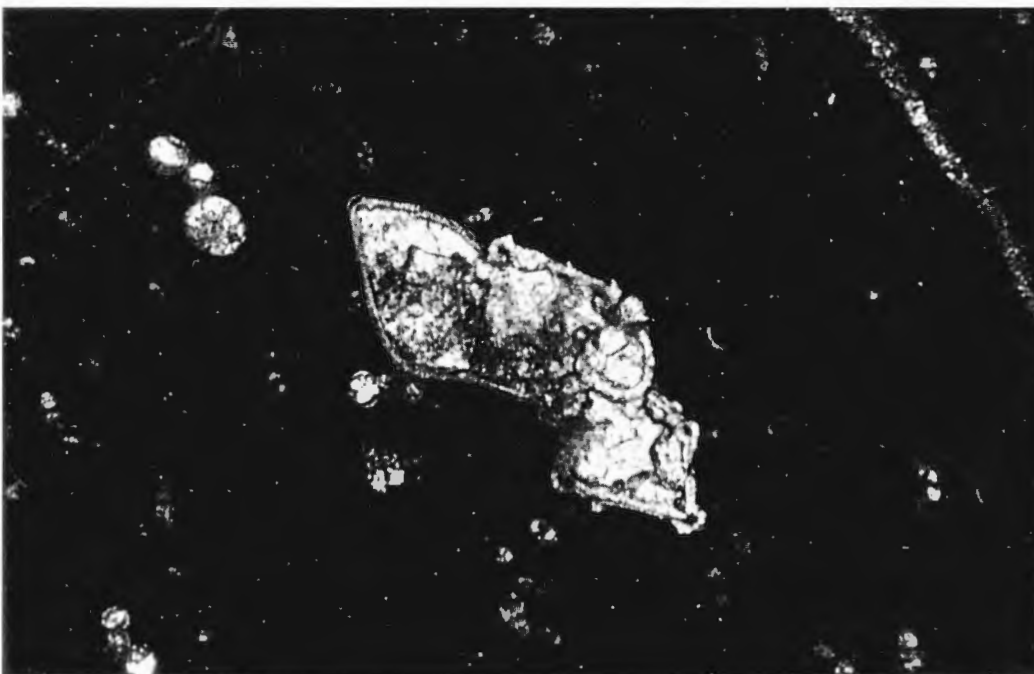
NEOCOMIAN								SENONIAN				
BERRIASIAN	VALANGINIAN	HAUTERIVIAN						BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN

Planktonic foraminifers with single keel appear in the
LATE ALBIAN.



Rotalipora ticinensis (GANDOLFI) (X 100).
UPPER ALBIAN of Gubbio, Umbria, Italy.

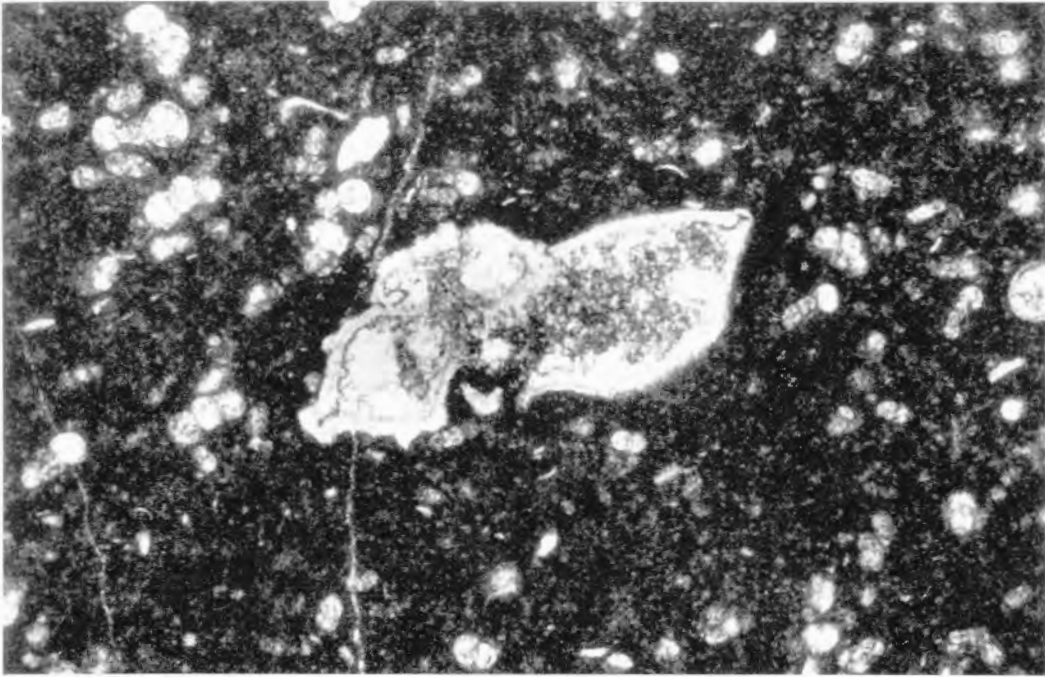
NEOCOMIAN								SENONIAN				
BERRIASIAN	VALANGINIAN	HAUTERIVIAN						BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN



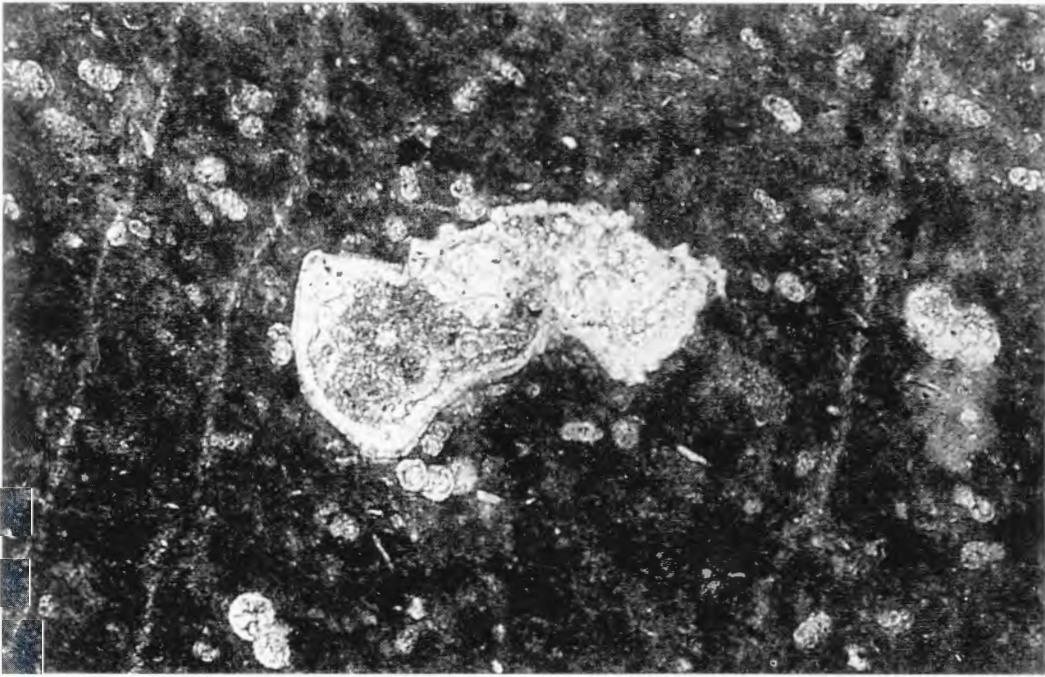
Rotalipora appenninica (RENZ) (X 100).
CENOMANIAN of Madonna della Croce 2
well, Abruzzo, Italy.

NEOCOMIAN								SENONIAN				
BERRIASIAN	VALANGINIAN	HAUTERIVIAN						BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN

Rotalipora is predominant in the CENOMANIAN
facies.

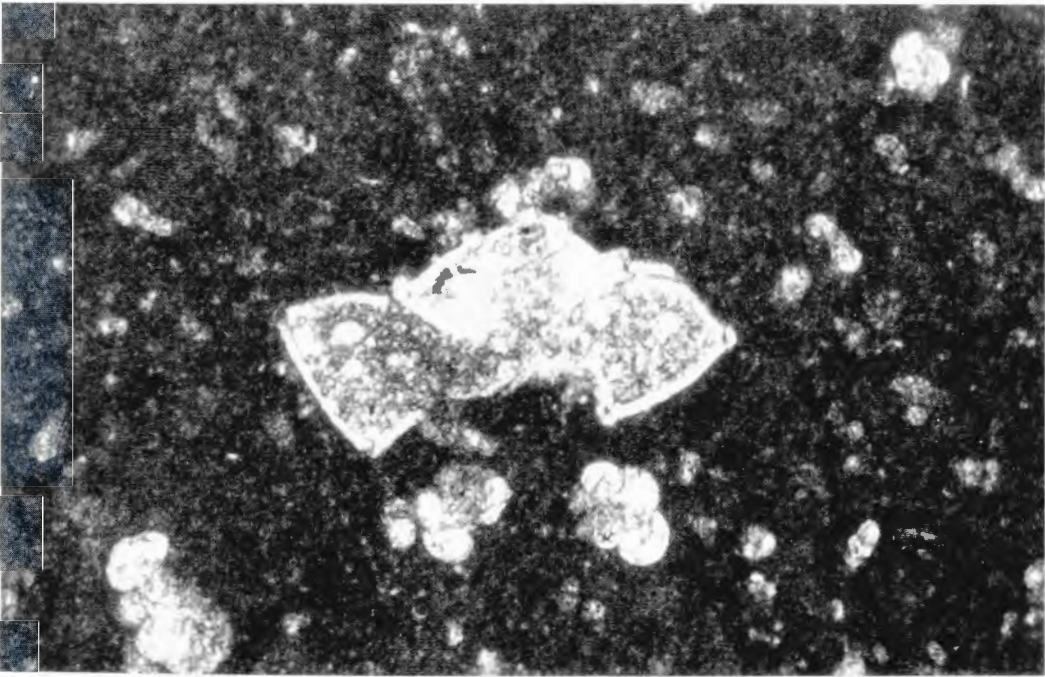


Rotalipora appenninica (RENZ) (X 100).
LOWER CENOMANIAN of Gubbio,
Umbria, Italy.



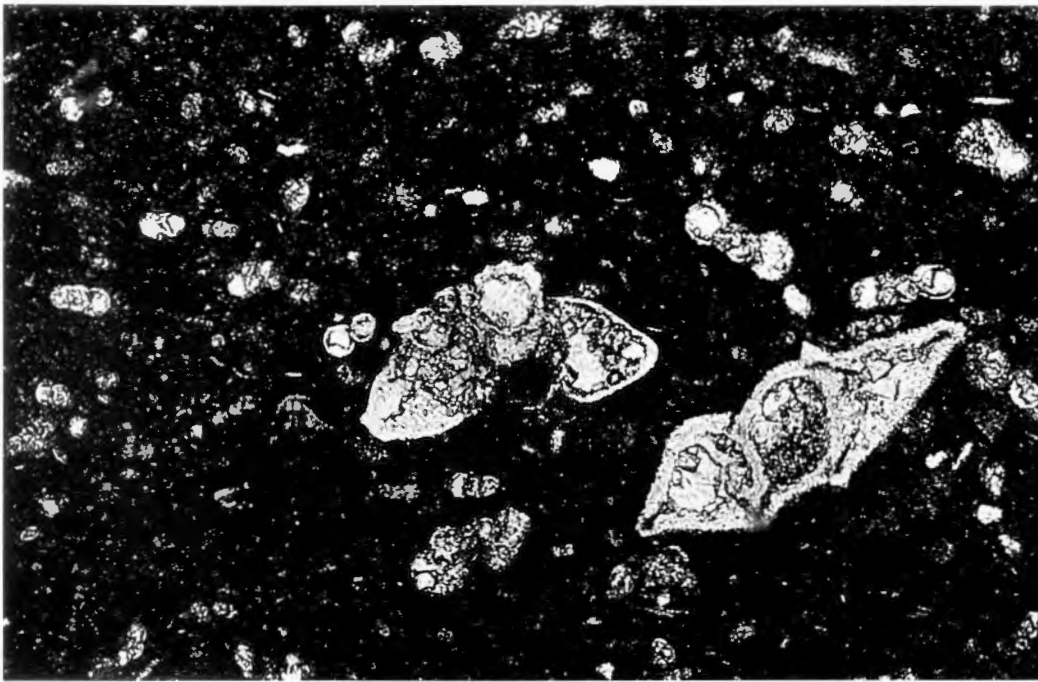
Rotalipora reicheli (MORNOD) (X 100).
MIDDLE CENOMANIAN of Segusino,
Venetia, Italy.

NEOCOMIAN						SENONIAN				
BERRIASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN	CAMPANIAN
										MAASTRICHTIAN



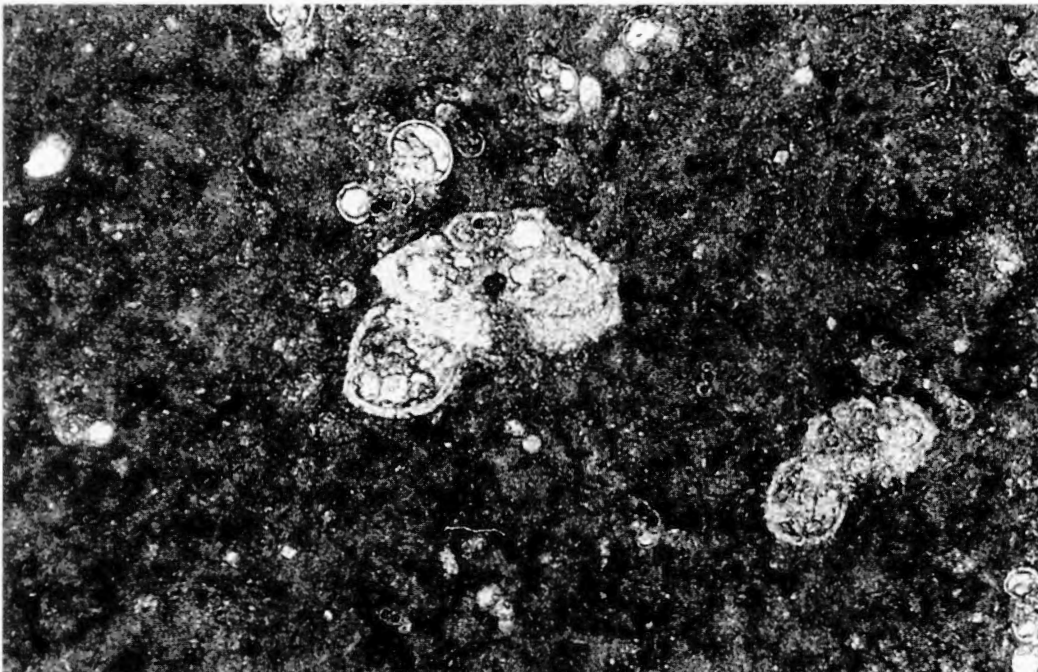
Rotalipora greenhornensis (MORROW)
(X 100).
CENOMANIAN of Trapani 1 well, Sicily,
Italy.

NEOCOMIAN						SENONIAN				
BERRIASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN	CAMPANIAN
										MAASTRICHTIAN

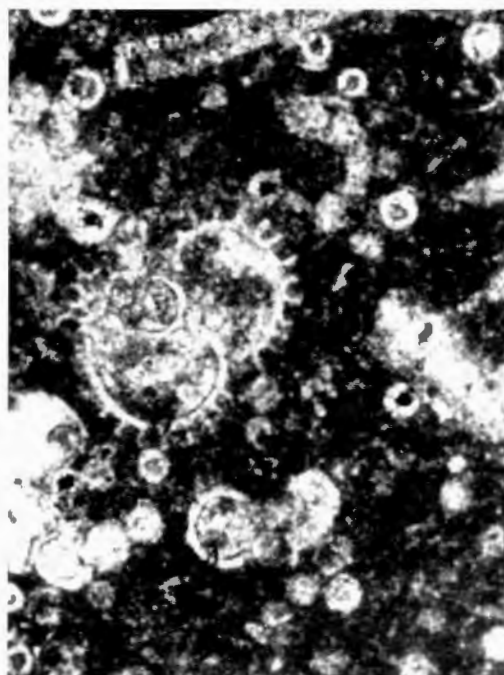
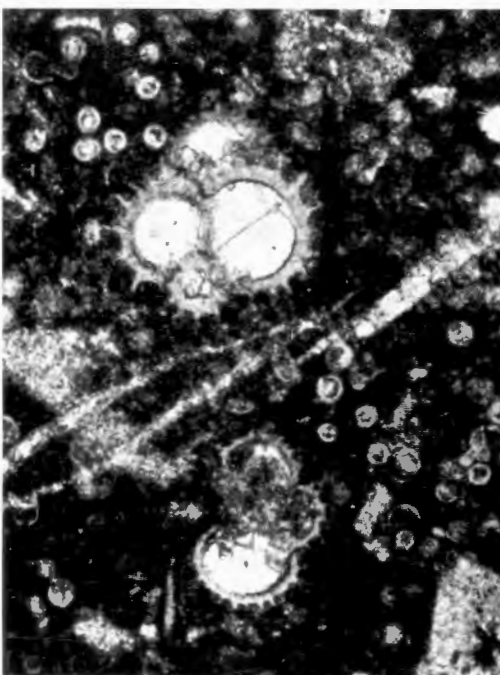


Praeglobotruncana gibba KLAUS (X 100).
LOWER CENOMANIAN of Madonna della
Croce 2 well, Abruzzo, Italy.

NEOCOMIAN								SENONIAN				
BERRIASIAN	VALANGINIAN	HAUTERIVIAN						BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN



Praeglobotruncana gibba KLAUS (X 90).
CENOMANIAN of Bovolone 1 well,
Venetia, Italy.

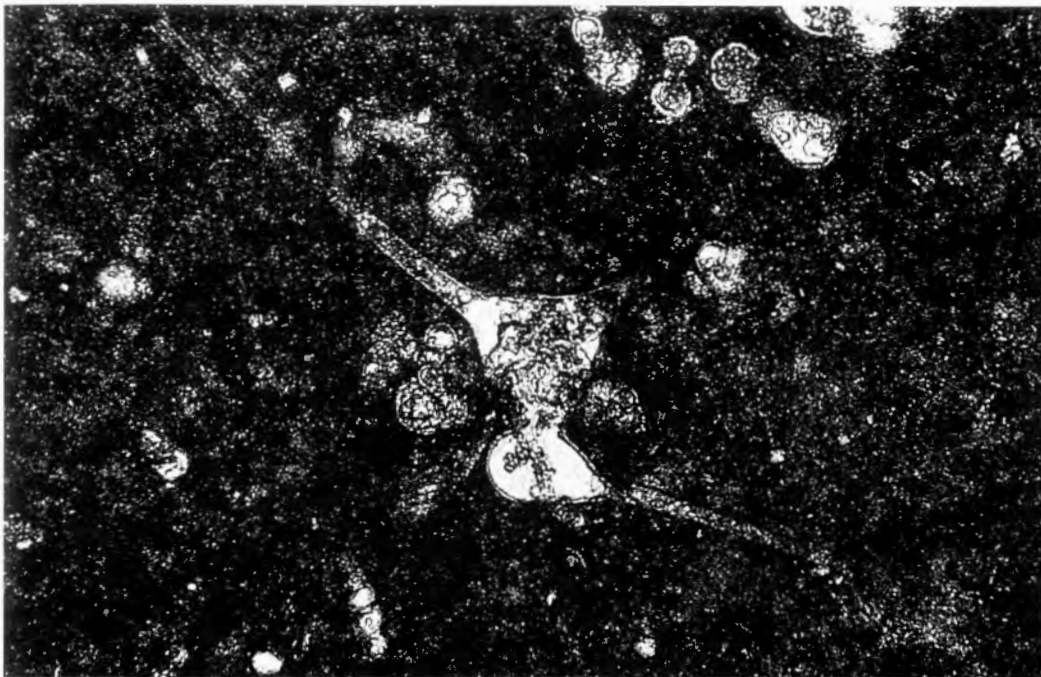


Favusella washitensis (CARSEY).
Calcisphaerulidae are present (X 80) (left).
LOWER CENOMANIAN of
Tang-e-Khanneshin, Zagros, Iran.

Favusella washitensis (CARSEY)
(X 100) (right).
LOWER CENOMANIAN of
Tang-e-Khanneshin, Zagros, Iran.

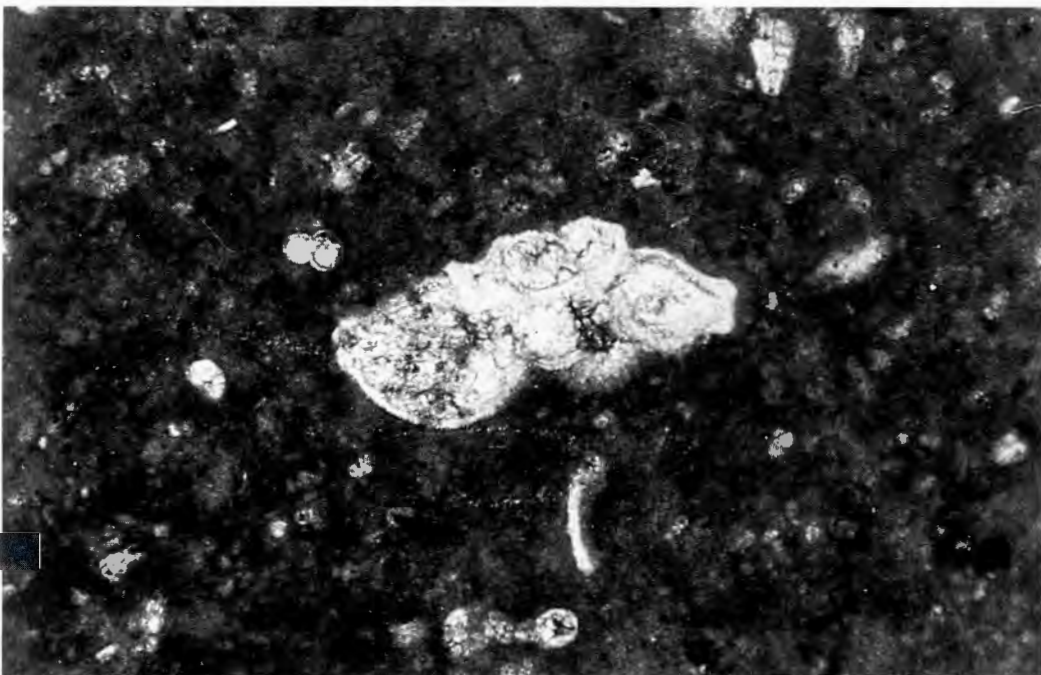
NEOCOMIAN								SENONIAN				
BERRIASIAN	VALANGINIAN	HAUTERIVIAN						BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN

This species shows a polygonal reticulated test
forming a honeycomb-like pattern.



Schackoina (X 110).
CENOMANIAN of Bovolone 1 well,
Venetia, Italy.

NEOCOMIAN								SENONIAN				
BERRIASIAN	VALANGINIAN	HAUTERIVIAN						BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN



Dicarinella (X 100).
TURONIAN of Rosella 1 well, Adriatic Sea.

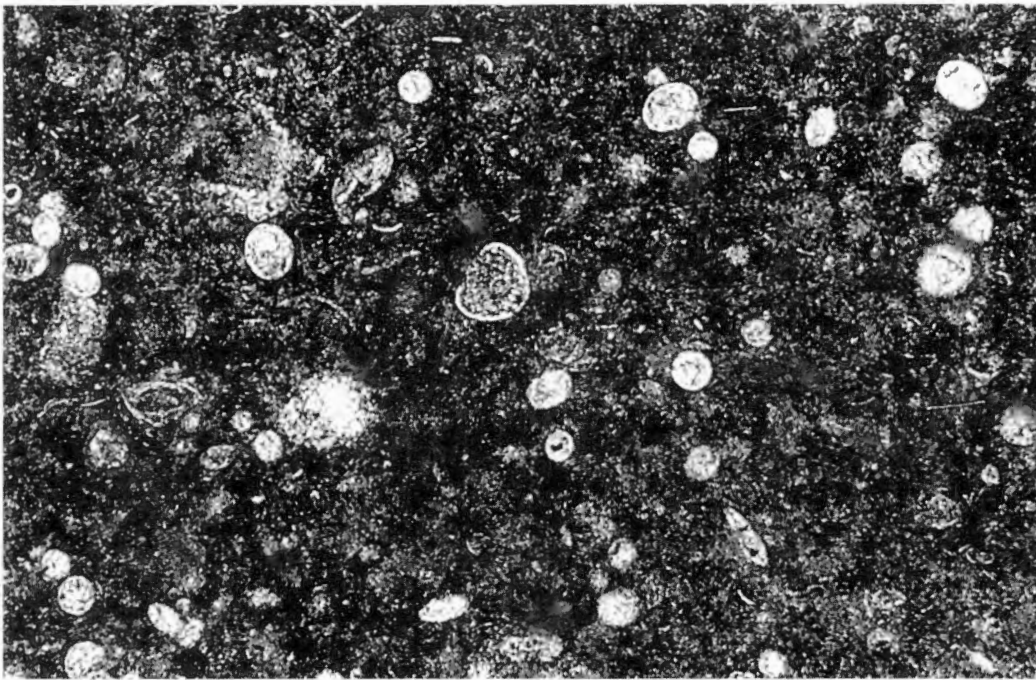
NEOCOMIAN								SENONIAN				
BERRIASIAN	VALANGINIAN	HAUTERIVIAN						BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN

This genus, which descends from *Praeglobotruncana*, is characterized by a true double-keel.



Dicarinella imbricata (MORNOD) (X 90).
TURONIAN of Segusino, Venetia, Italy.

NEOCOMIAN								SENONIAN				
BERRIASIAN	VALANGINIAN	HAUTERIVIAN						BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN



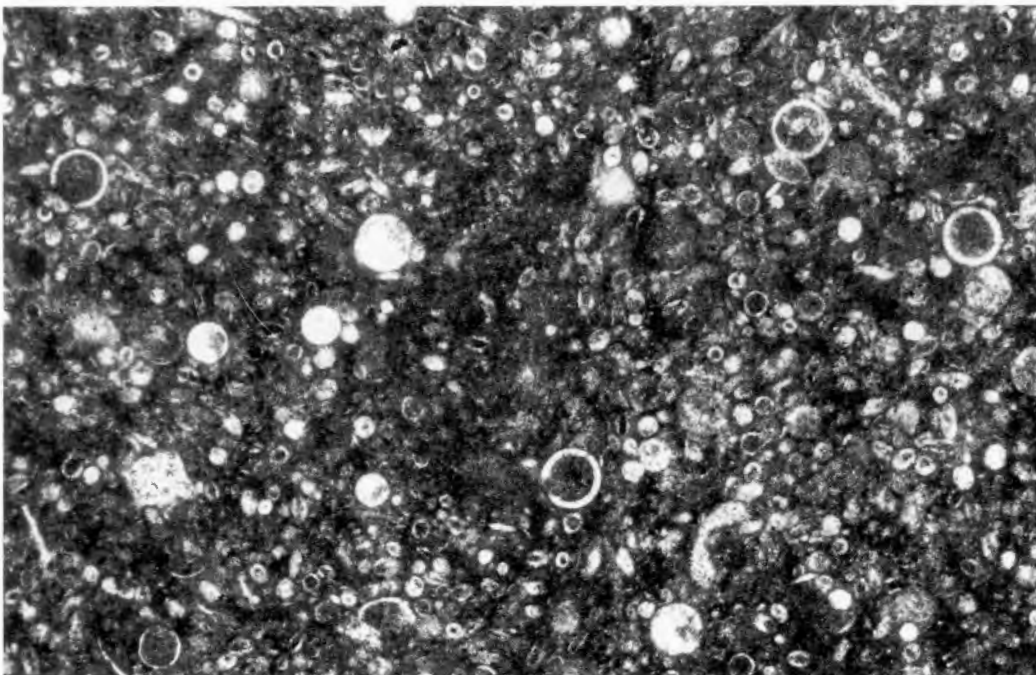
Bonetocardiella conoidea (BONET). Other genera of *Calcisphaerulidae* are present (X 120).

UPPER ALBIAN of Bovolone 1 well, Venetia, Italy.

Detail from ANDRI 1972 (X 180).

NEOCOMIAN			SENONIAN									
BERRIASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN	CAMPANIAN	MAASTRICHTIAN	

Calcisphaerulidae, which are calcareous dinoflagellate cysts, become particularly common in thin section from the LATE ALBIAN to the EARLY SENONIAN.



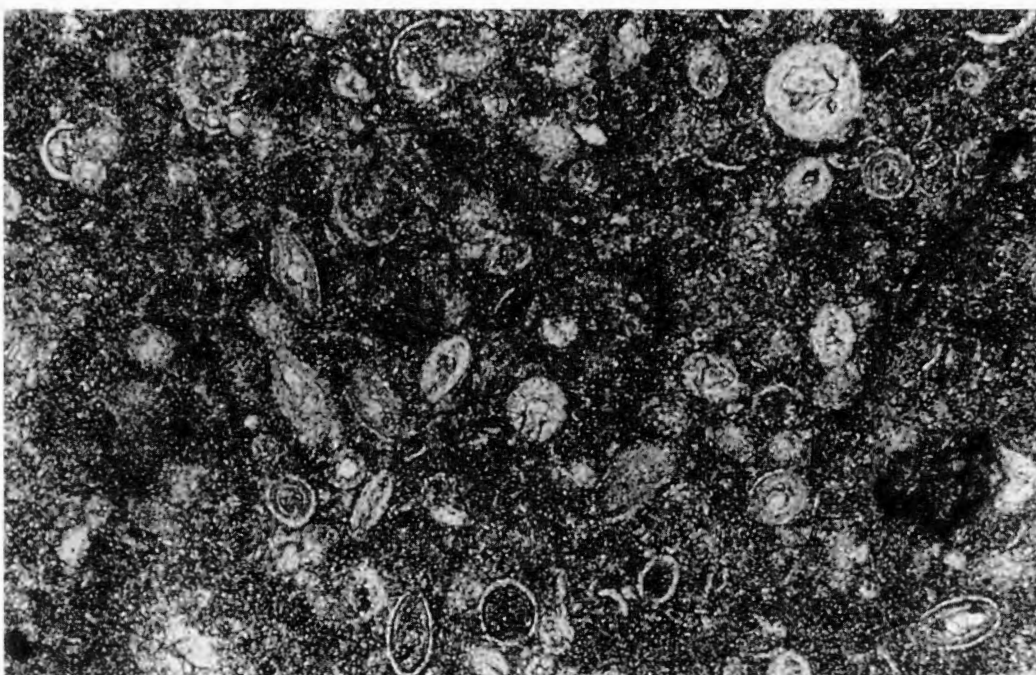
"Stomiosphaera" sphaerica (KAUFMANN).

Calcisphaerula innominata BONET and *Pithonella ovalis* (KAUFMANN) are present (X 80).

LOWER TURONIAN of Ras Fartaq, P.D.R. of Yemen.

Detail from ANDRI 1972 (X 110).

NEOCOMIAN			SENONIAN									
BERRIASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN	CAMPANIAN	MAASTRICHTIAN	



Pithonella ovalis (KAUFMANN).

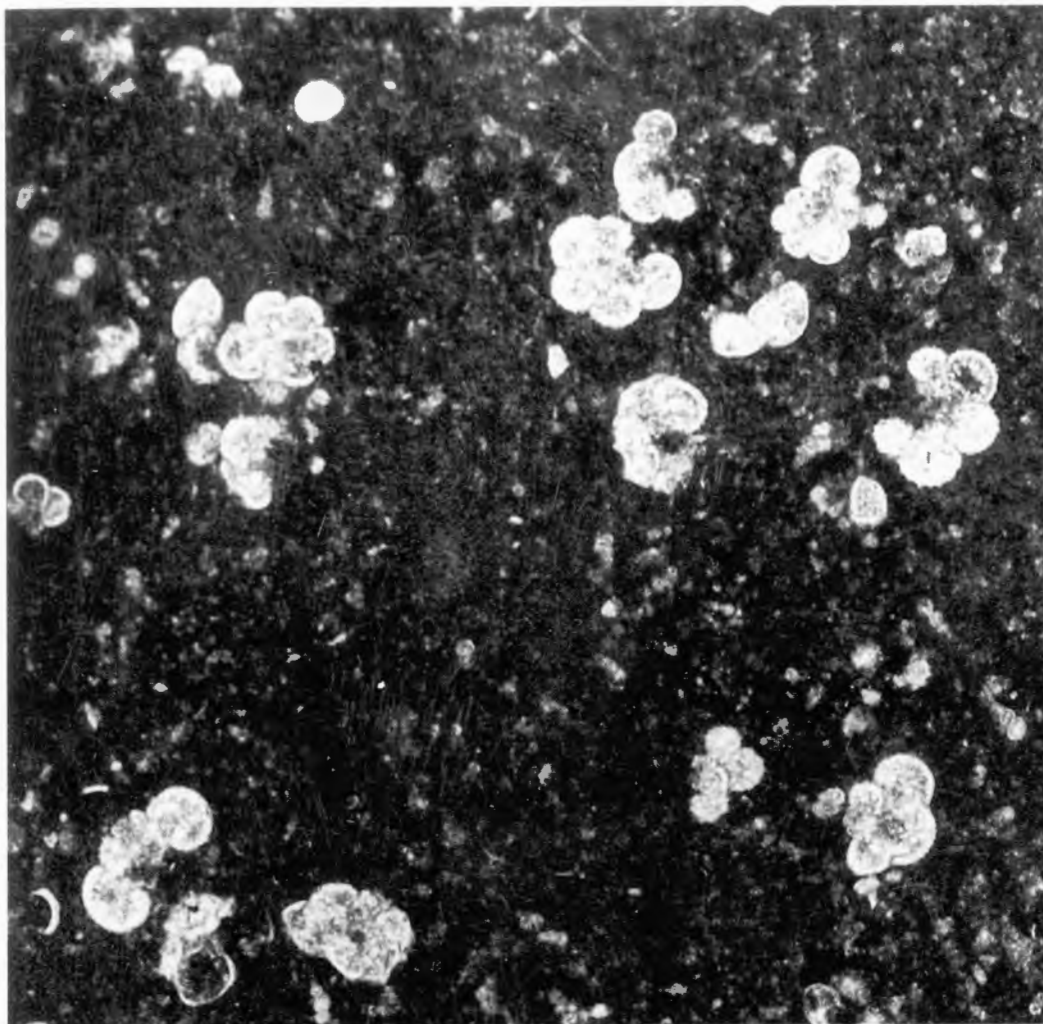
Calcisphaerula innominata BONET is also present (X 120).

CONIACIAN of Bovolone 1 well, Venetia, Italy.

Detail from ANDRI 1972 (X 160).

NEOCOMIAN			SENONIAN									
BERRIASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN	CAMPANIAN	MAASTRICHTIAN	

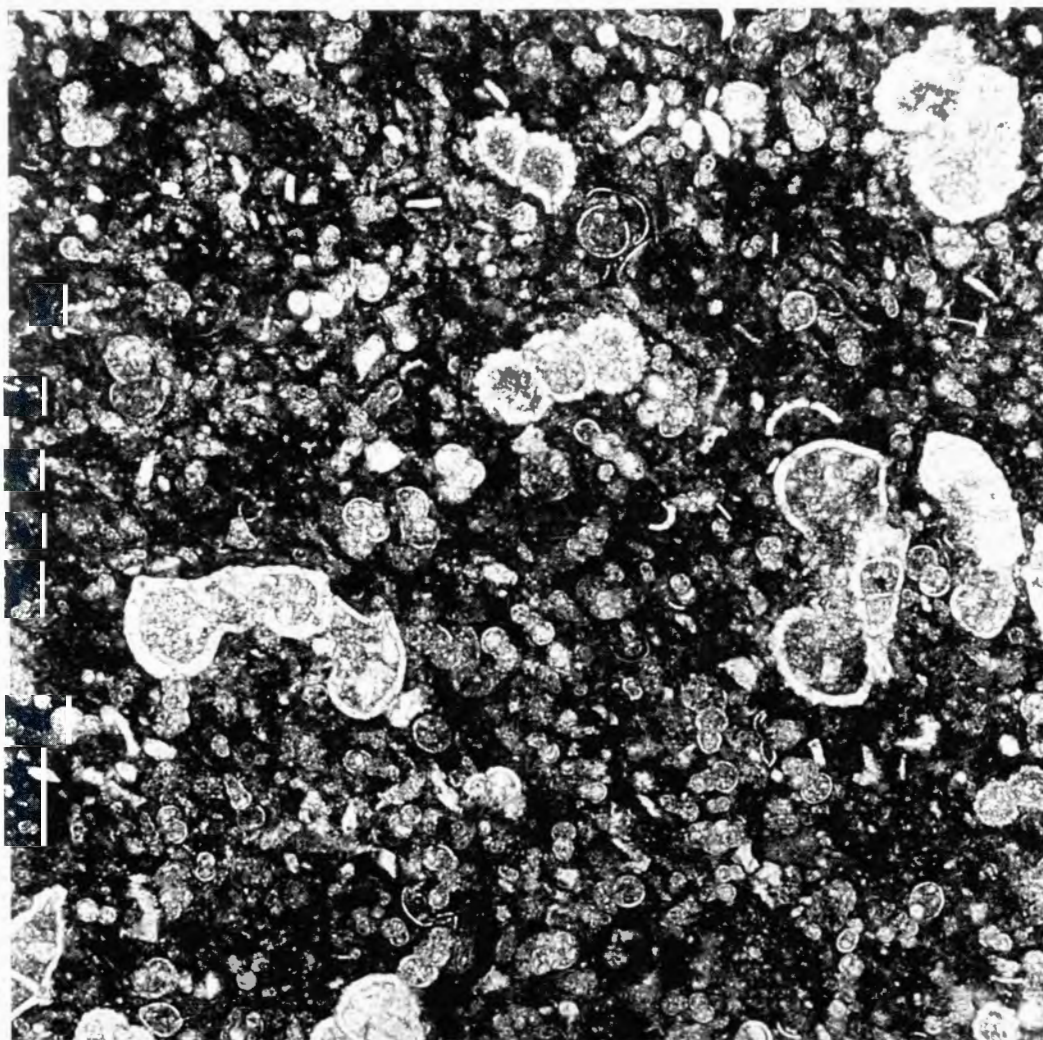




Whiteinella (X 50).
TURONIAN of Segusino, Venetia, Italy.

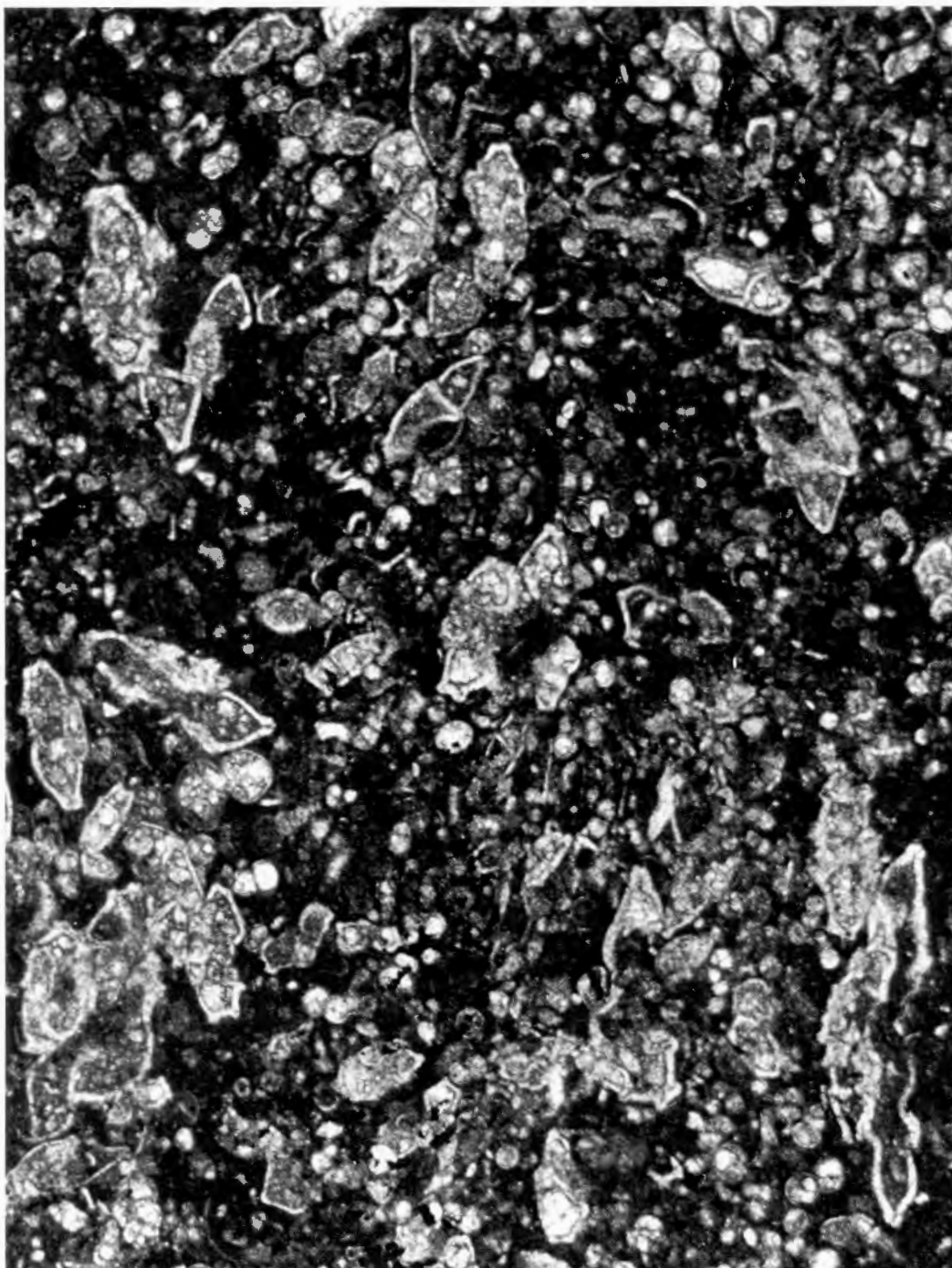
NEOCOMIAN			SENONIAN				
BERRIASIAN	VALANGINIAN	HAUTERVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN
							CONIACIAN
							SANTONIAN
							CAMPANIAN
							MAASTRICHTIAN

The EARLY TURONIAN is characterized by large planktonic with spiny surfaces. In fact at the CENOMANIAN - TURONIAN boundary a significant decrease of keeled forms occurs.



Helvetoglobotruncana helvetica (BOLLI).
Praeglobotruncana and *Globotruncanidae* are present (X 60).
LOWER-MIDDLE TURONIAN of Segusino, Venetia, Italy.

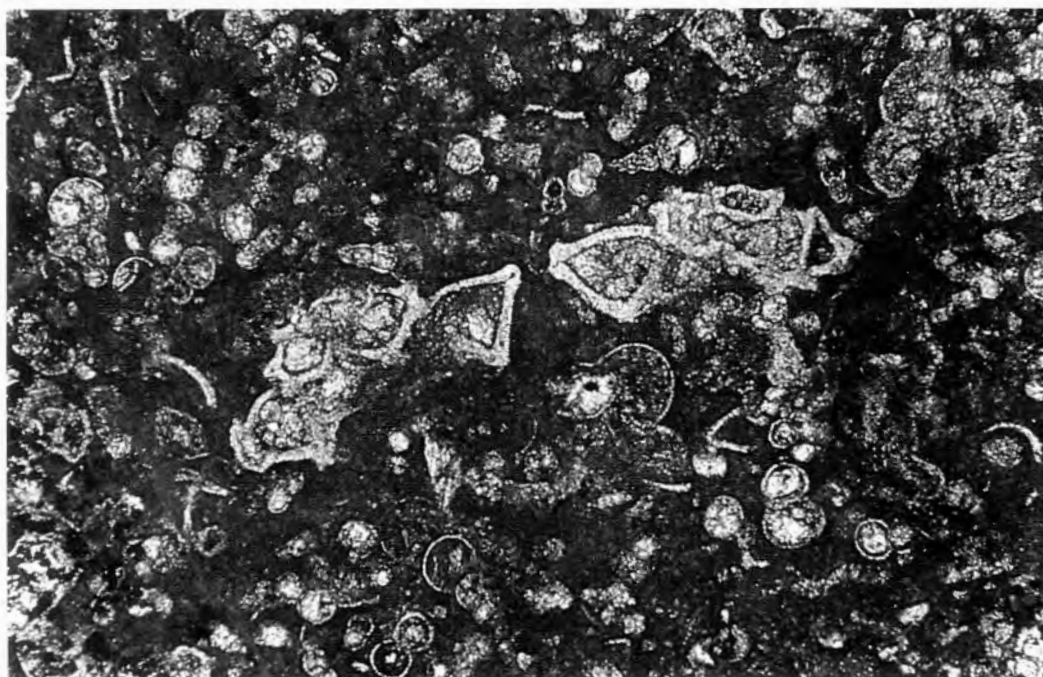
NEOCOMIAN			SENONIAN				
BERRIASIAN	VALANGINIAN	HAUTERVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN
							CONIACIAN
							SANTONIAN
							CAMPANIAN
							MAASTRICHTIAN



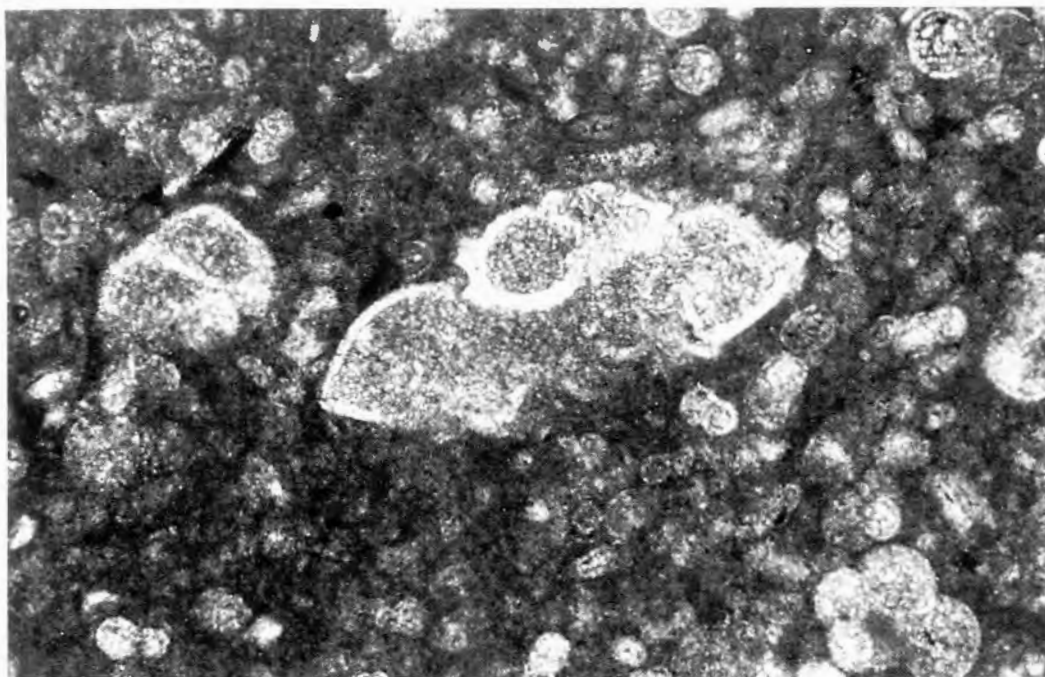
Marginotruncana (X 40).
UPPER TURONIAN-LOWER CONIACIAN
of Rosella 1 well, Adriatic Sea.

NEOCOMIAN			SENONIAN							
BERRIASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN	CAMPANIAN

The LATE TURONIAN is characterized by a high frequency of double keeled low-trochospiral forms.



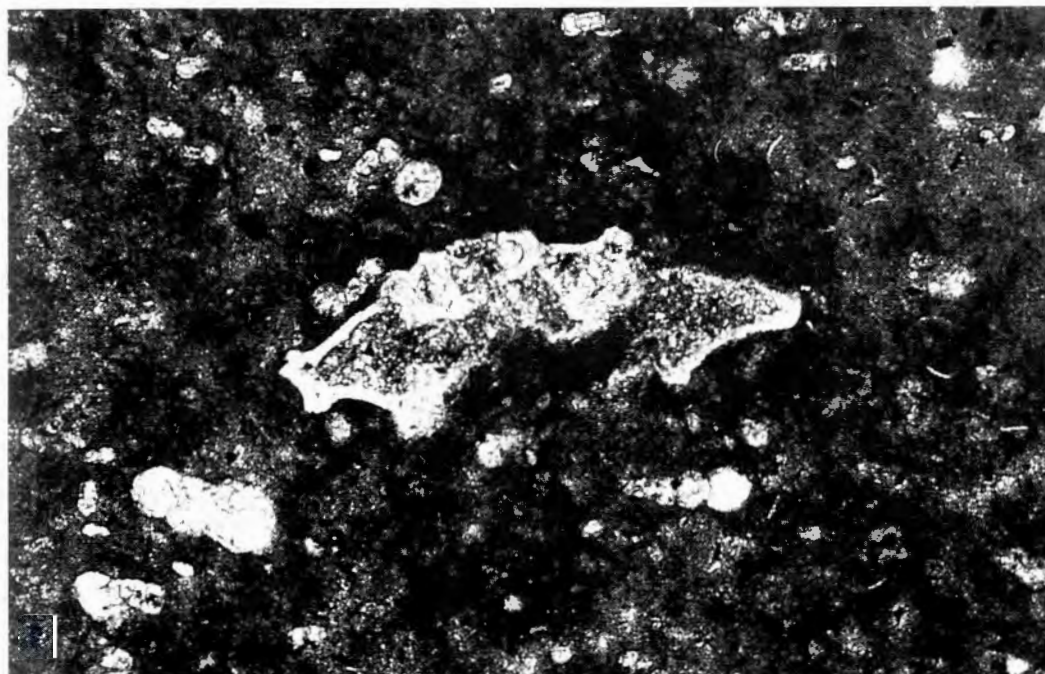
Marginotruncana (X 60).
CONIACIAN of Monte Conero, Marche,
Italy.



Marginotruncana gr. *sigali* (REICHEL)
(X 110).
CONIACIAN of Passo S. Boldo, Venetia,
Italy.

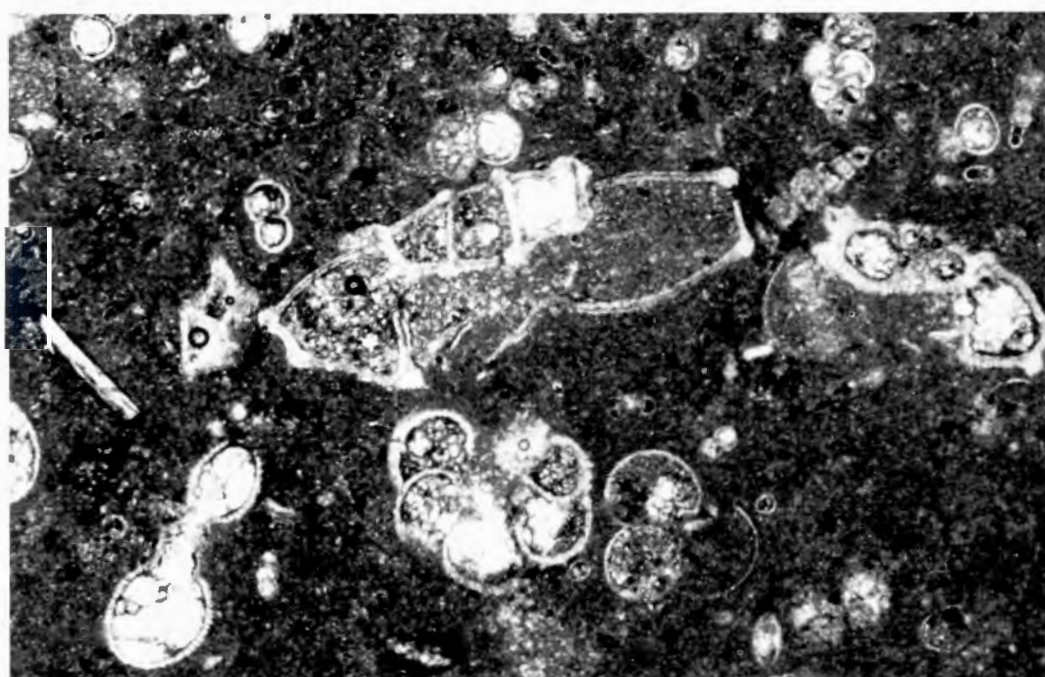
NEOCOMIAN								SENONIAN			
BERRIASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN	CAMPANIAN	MAASTRICHTIAN

Marginotruncana schneegansi (SIGAL) belongs to this group.



Marginotruncana coronata BOLLI (X 110).
CONIACIAN-SANTONIAN of Naftia 1 well,
Sicily, Italy.

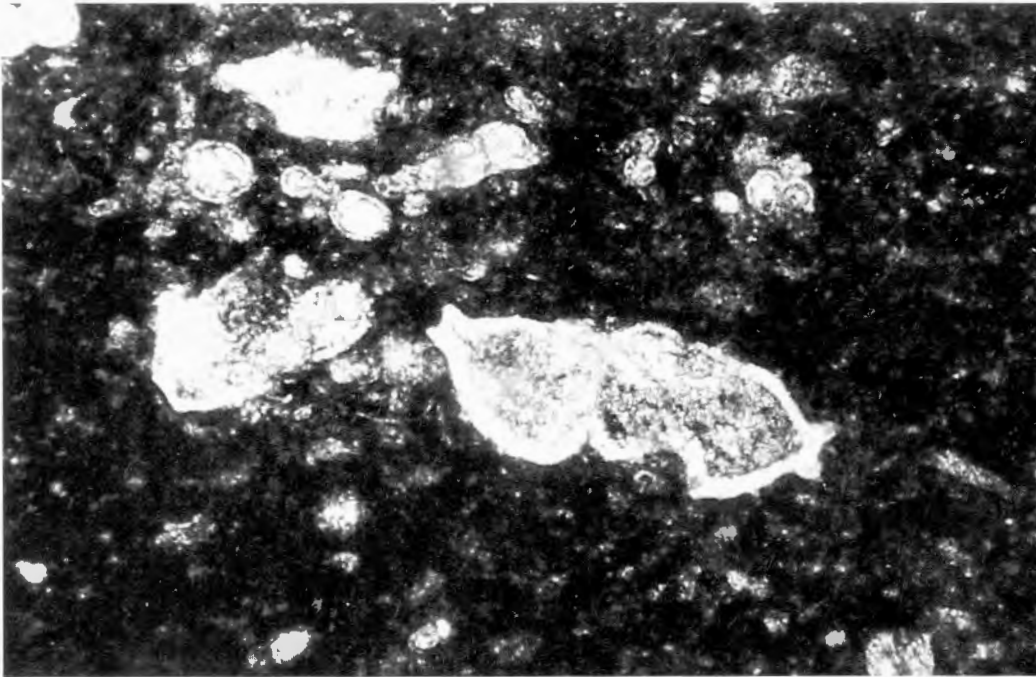
NEOCOMIAN								SENONIAN			
BERRIASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN	CAMPANIAN	MAASTRICHTIAN



Marginotruncana gr. *pseudolinneiana*
PESSAGNO (X 85).
SANTONIAN of Bovolone 1 well, Venetia,
Italy.

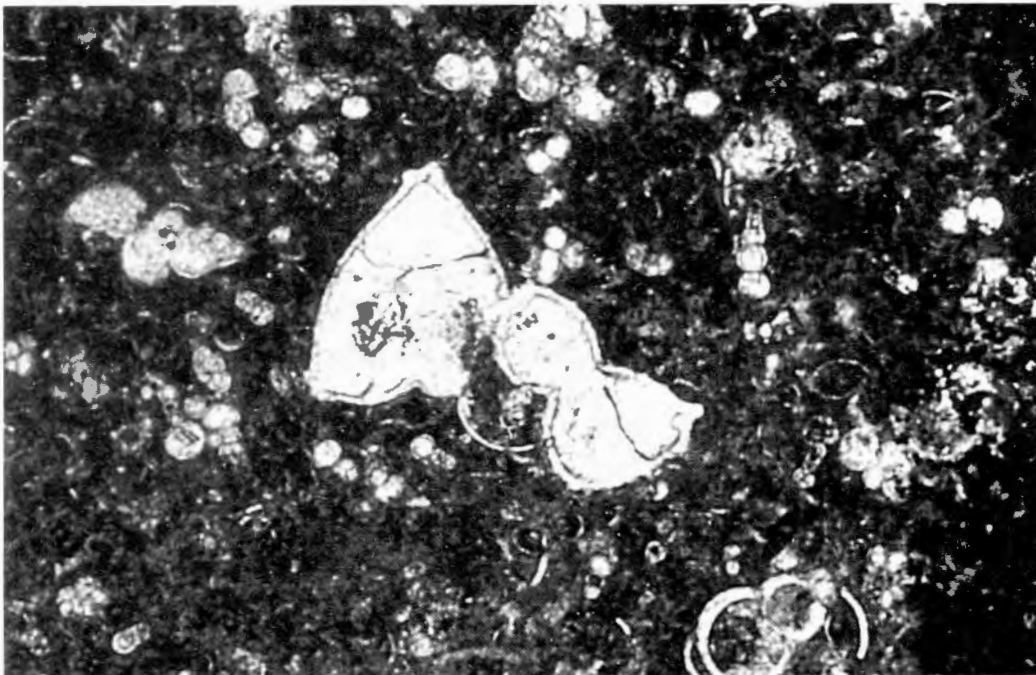
NEOCOMIAN								SENONIAN			
BERRIASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN	CAMPANIAN	MAASTRICHTIAN

These forms are not easily distinguished from
Globotruncana gr. *linneiana* (D'ORBIGNY) in thin-section.



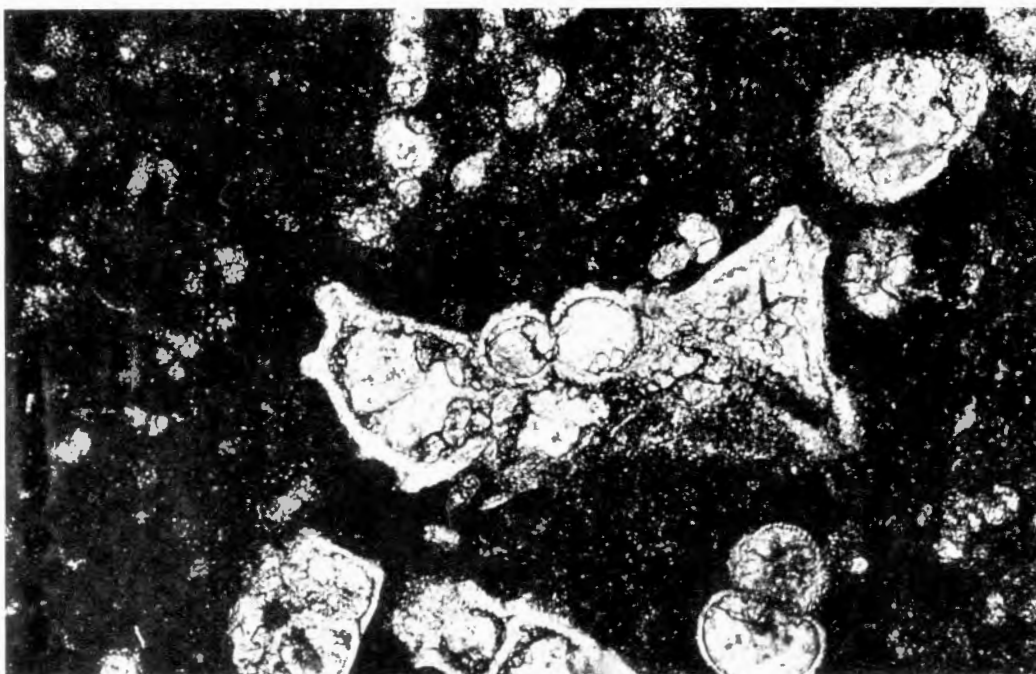
Dicarinella primitiva (DALBIEZ) (X 110).
CONIACIAN of Segusino, Venetia, Italy.

NEOCOMIAN				SENONIAN							
BERRIASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN	CAMPANIAN	MAASTRICHTIAN



Dicarinella concavata (BROTZEN) (X 120).
SANTONIAN of Guzanun, Zagros, Iran.

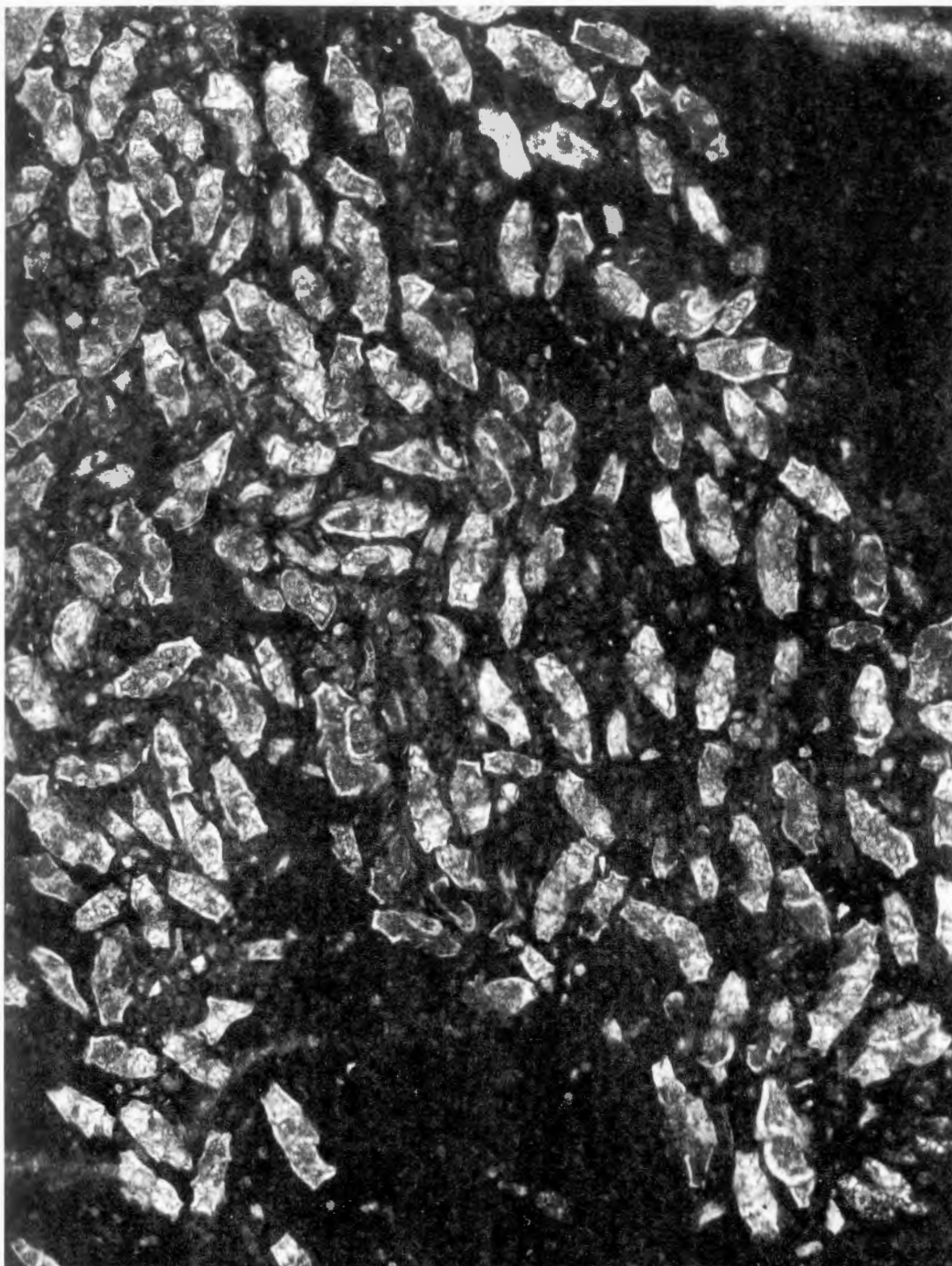
NEOCOMIAN				SENONIAN							
BERRIASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN	CAMPANIAN	MAASTRICHTIAN



Dicarinella asymetrica (SIGAL) (X 120).
SANTONIAN of Gambettola 1 well,
Romagna, Italy.

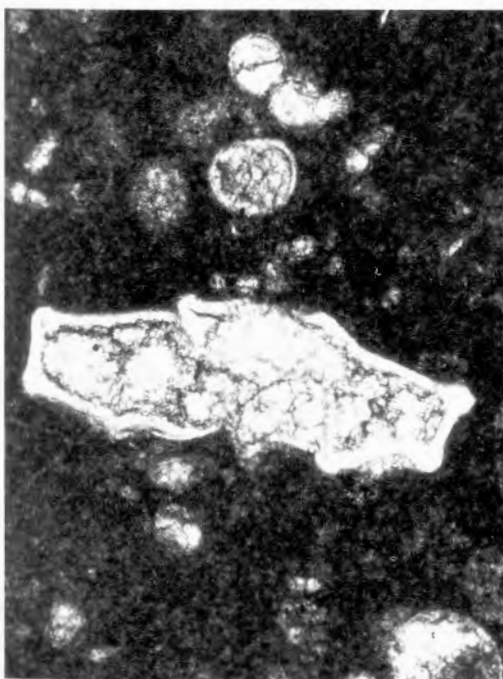
NEOCOMIAN				SENONIAN							
BERRIASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN	CAMPANIAN	MAASTRICHTIAN

This species differs from the former owing to the presence of a periumbilical ridge.



Marginotruncana, *Dicarinella* and *Globotruncana* (X 25).
CONIACIAN-SANTONIAN of Val Noana,
Trentino, Italy.

Assemblages with double-keeled forms are typical of
the EARLY SENONIAN.



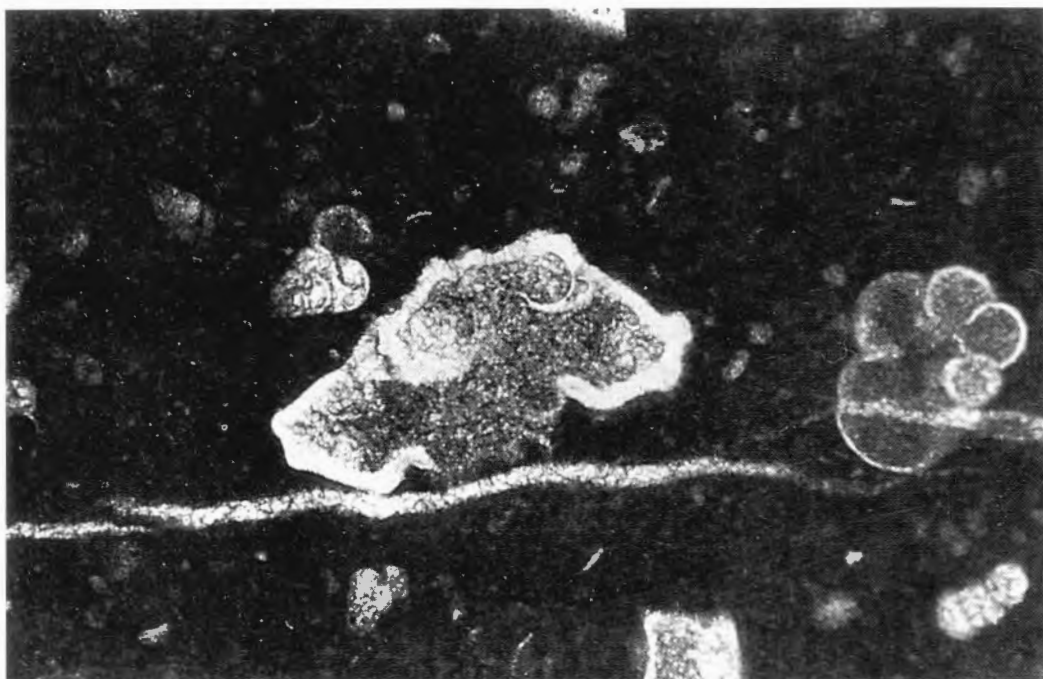
Globotruncana gr. *linneiana* (D'ORBIGNY)
(X 120) (left).
CAMPANIAN of Naftia 1 well, Sicily, Italy.



Globotruncana gr. *linneiana* (D'ORBIGNY)
(X 150) (right).
CAMPANIAN of Naftia 1 well, Sicily, Italy.

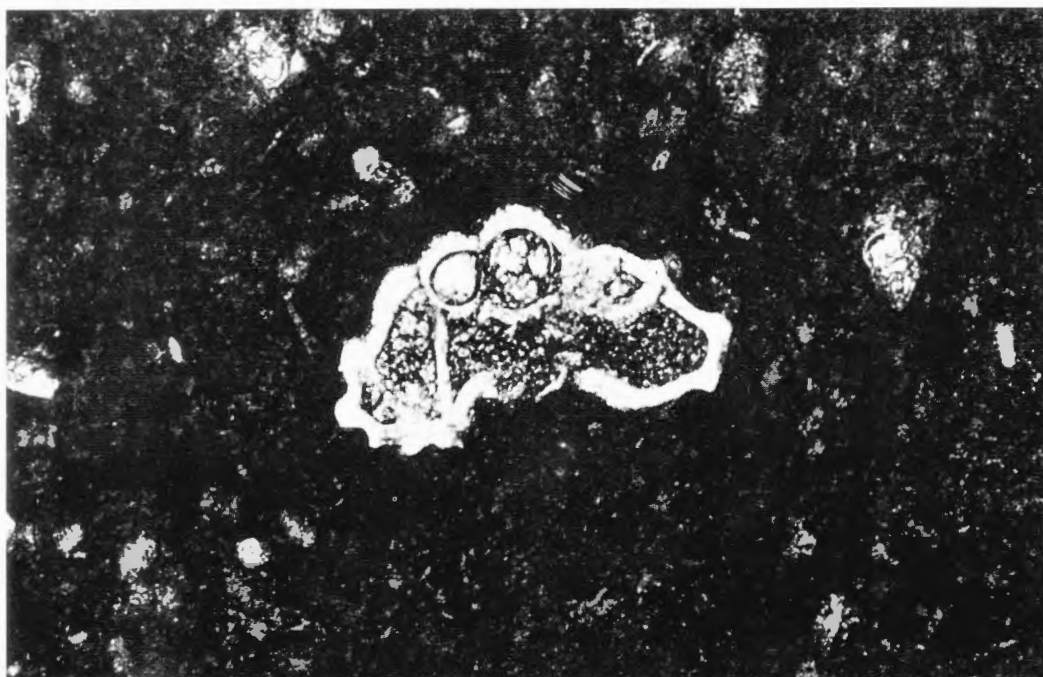
NEOCOMIAN								SENONIAN			
BERRIASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN	CAMPANIAN	MAASTRICHTIAN

This group includes *Globotruncana lapparenti*
BROTZEN and *Globotruncana tricarinata* (QUEREAU).



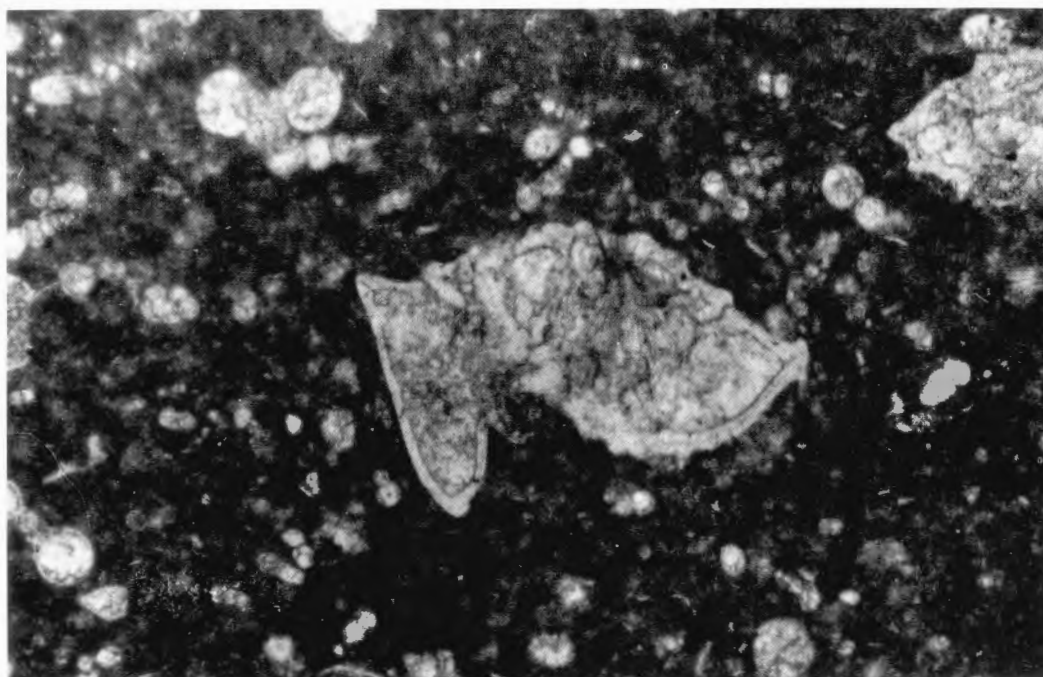
Globotruncana (Rosita) fornicata (PLUMMER)
(X 100).
CAMPANIAN-LOWER MAASTRICHTIAN of
Pizzo Merio, Sicily, Italy.

NEOCOMIAN			SENONIAN							
BERRIASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN	MAASTRICHTIAN



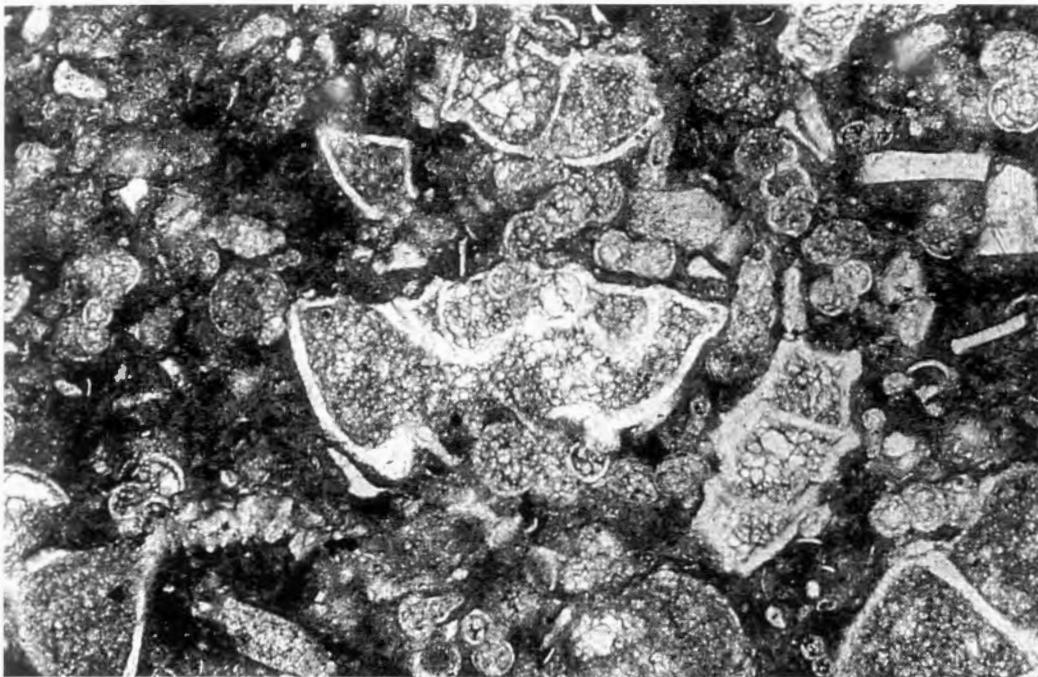
Globotruncana arca (CUSHMAN) (X 100).
CAMPANIAN of Naftia 1 well, Sicily, Italy.

NEOCOMIAN			SENONIAN							
BERRIASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN	MAASTRICHTIAN



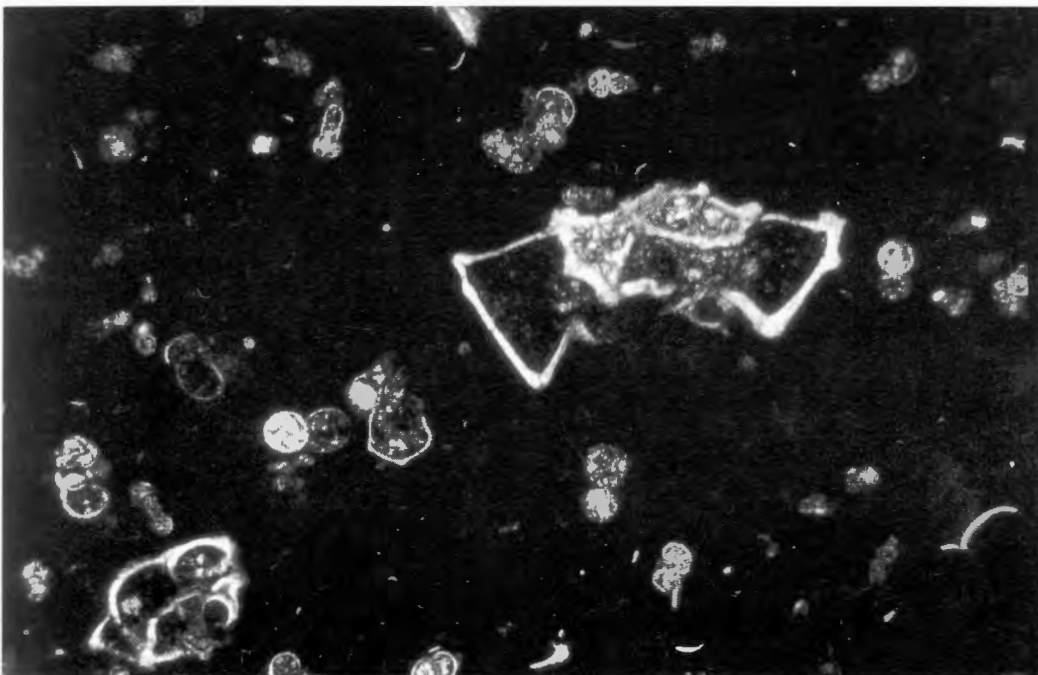
Globotruncana (Globotruncanita) elevata
(BROTZEN) (X 70).
CAMPANIAN of Gubbio, Umbria, Italy.

NEOCOMIAN			SENONIAN							
BERRIASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN	MAASTRICHTIAN



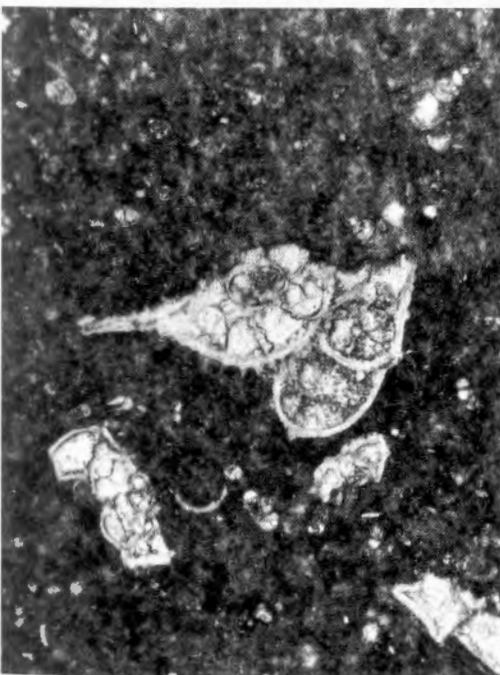
Globotruncana (Globotruncanita) gr. stuartiformis DALBIEZ (X 100).
LOWER MAASTRICHTIAN of Segusino 1 well, Venetia, Italy.

NEOCOMIAN			SENONIAN									
BERRIASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN	CAMPANIAN	MAASTRICHTIAN	

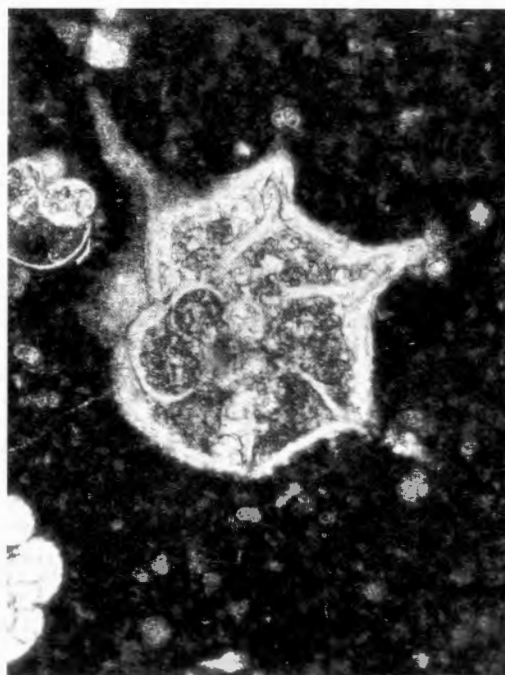


Globotruncana ventricosa WHITE (X 90).
CAMPANIAN-LOWER MAASTRICHTIAN of Valdorbis, Umbria, Italy.

NEOCOMIAN			SENONIAN									
BERRIASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN	CAMPANIAN	MAASTRICHTIAN	

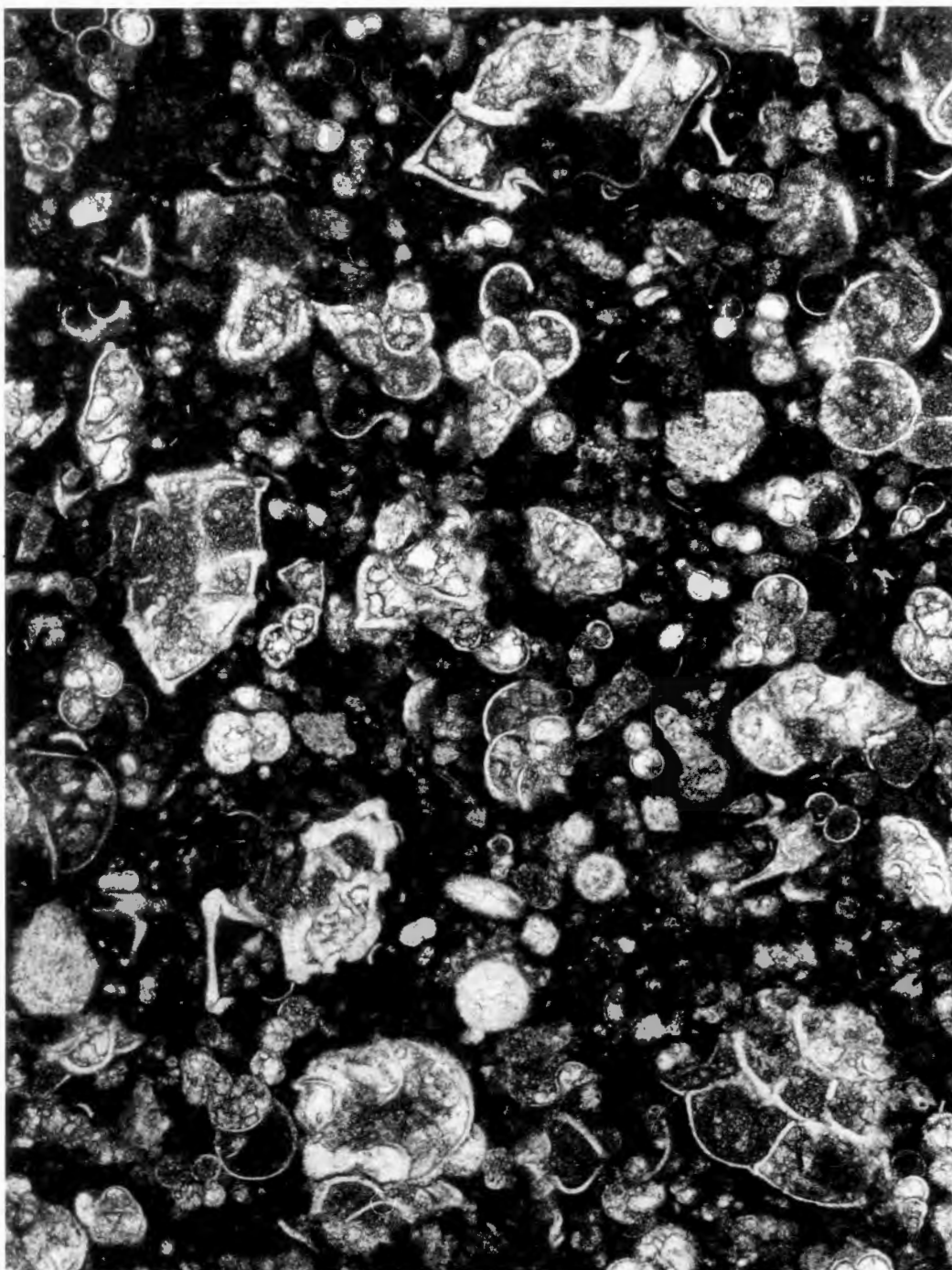


Globotruncana (Globotruncanita) calcarata (CUSHMAN) (X 65) (left).
UPPER CAMPANIAN of Monte Conero, Marche, Italy.



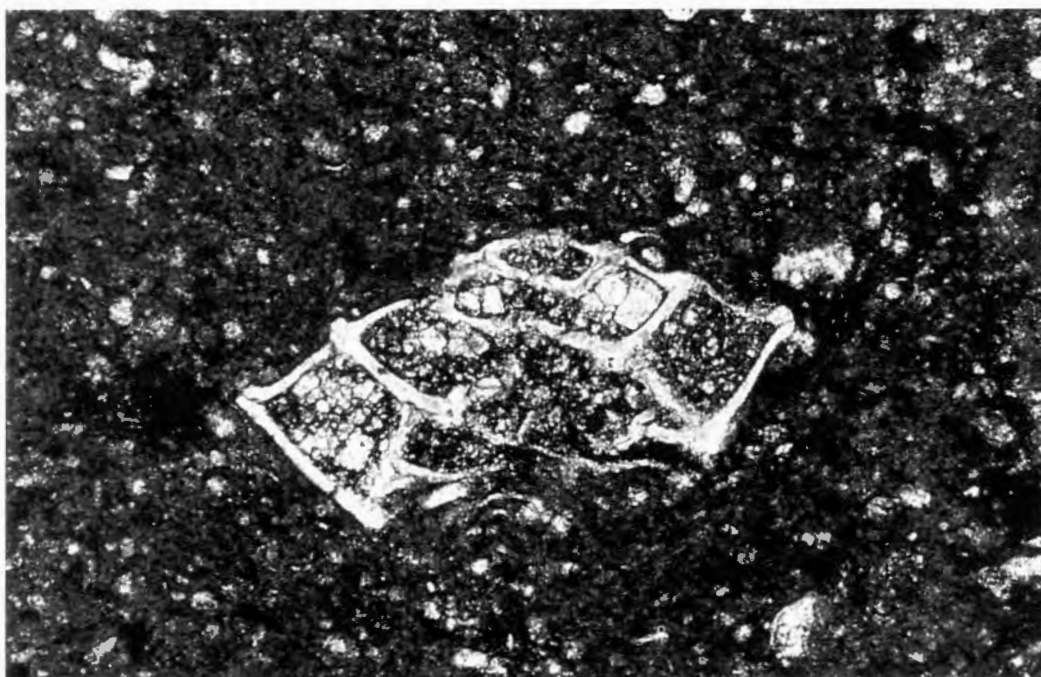
Globotruncana (Globotruncanita) calcarata (CUSHMAN) (X 90) (right).
UPPER CAMPANIAN of Monte Bonifato, Sicily, Italy.

NEOCOMIAN			SENONIAN									
BERRIASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN	CAMPANIAN	MAASTRICHTIAN	



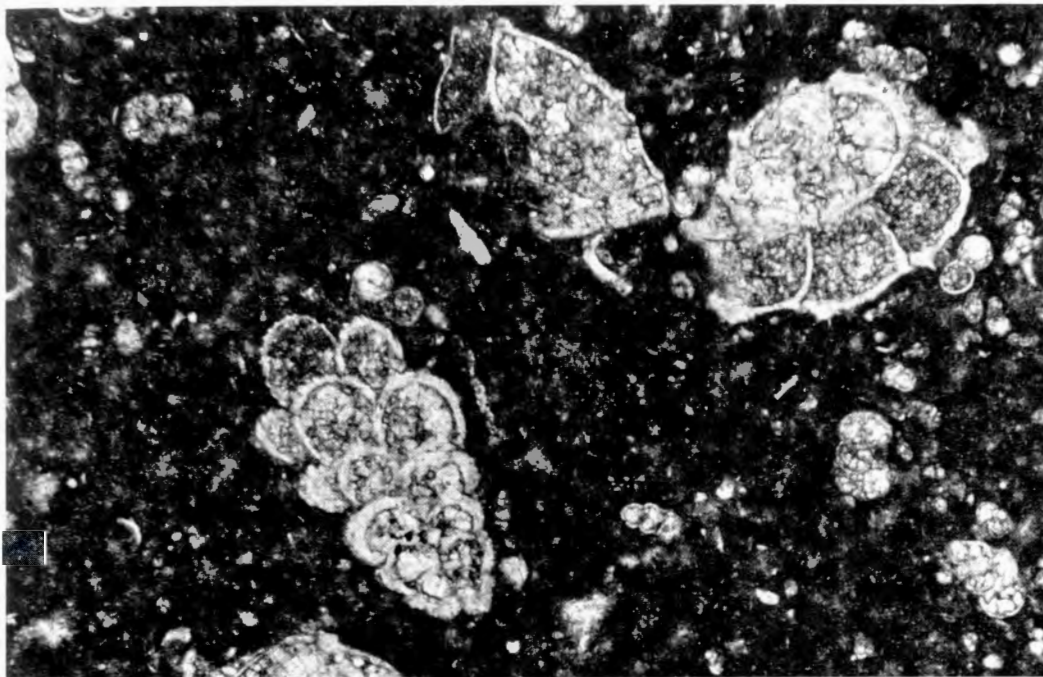
Globotruncana (Globotruncanita) gr. stuarti (DE LAPPARENT), *Globotruncanidae*, and *Heterohelicidae* (X 65).
MAASTRICHTIAN of Arrone, Umbria, Italy.

The MAASTRICHTIAN is characterized by an increase of single keeled forms compared to double keeled species which decrease progressively.



Globotruncana (Globotruncanita) stuarti (DE LAPPARENT) (X 90).
MAASTRICHTIAN of Gianna 2 well, Adriatic Sea.

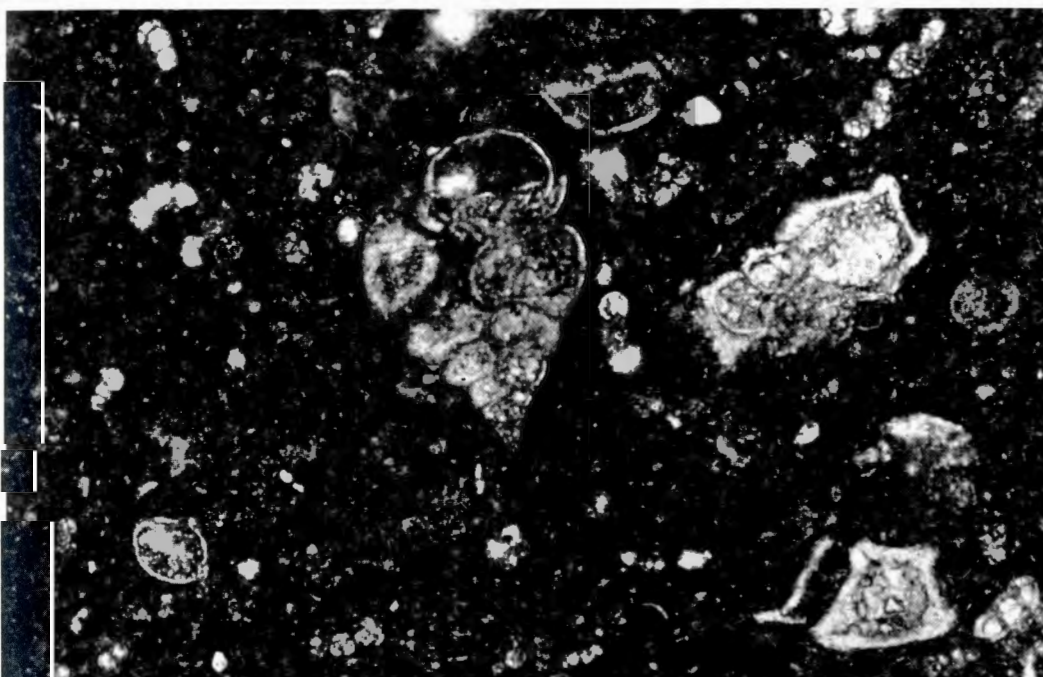
NEOCOMIAN						SENONIAN			
BERRIASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	MAASTRICHTIAN



Heterohelicidae. Globotruncanidae are present (X 70).
MIDDLE-UPPER MAASTRICHTIAN of Monte Conero, Marche, Italy.

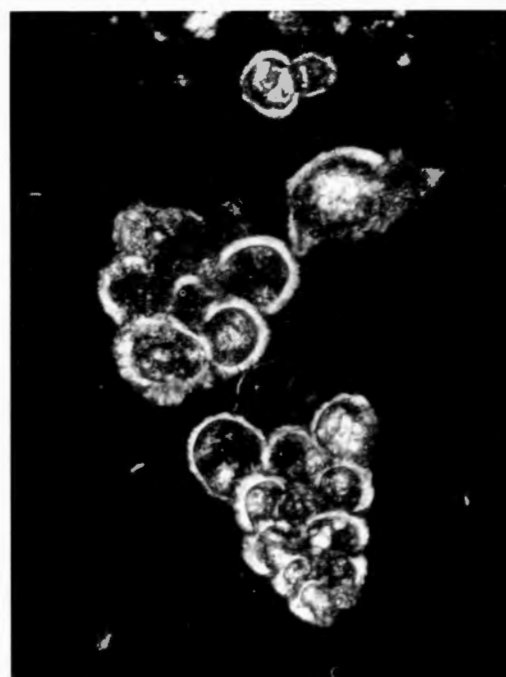
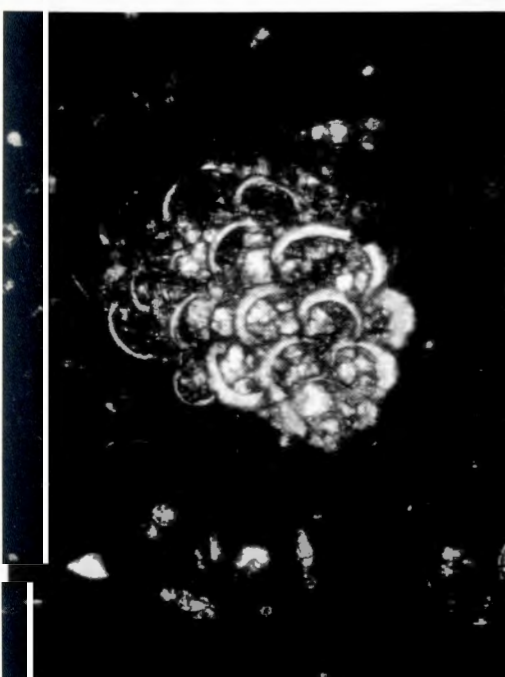
NEOCOMIAN							SENONIAN			
BERRIASIAN	VALANGINIAN	HAUTERVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN	CAMPANIAN
										MAASTRICHTIAN

The planktonic assemblages of the MIDDLE-LATE MAASTRICHTIAN are characterized by a high number of forms belonging to the *Heterohelicidae* family.



Heterohelix. Globotruncanidae are present (X 80).
MAASTRICHTIAN of Monte Conero, Marche, Italy.

Biserial *Heterohelicidae* occur at the end of the EARLY CRETACEOUS. They become frequent in the MIDDLE CENOMANIAN and are abundant from the MIDDLE MAASTRICHTIAN.

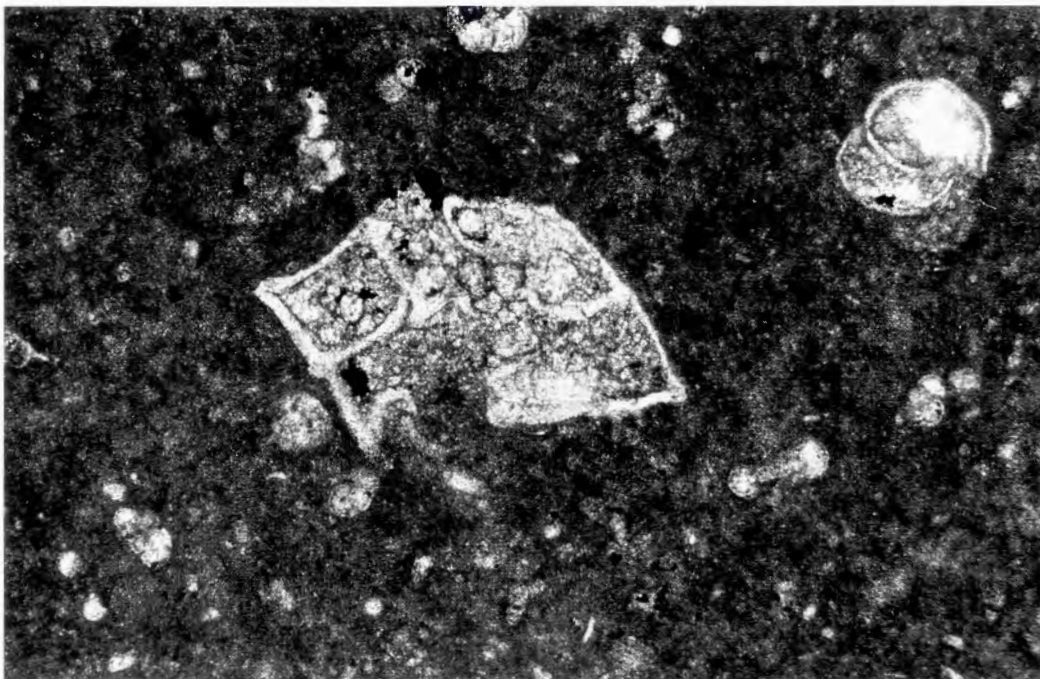


Heterohelicidae (X 80) (left).
MAASTRICHTIAN of Monte Conero, Marche, Italy.

Heterohelicidae (X 70) (right).
MAASTRICHTIAN of Gubbio, Umbria, Italy.

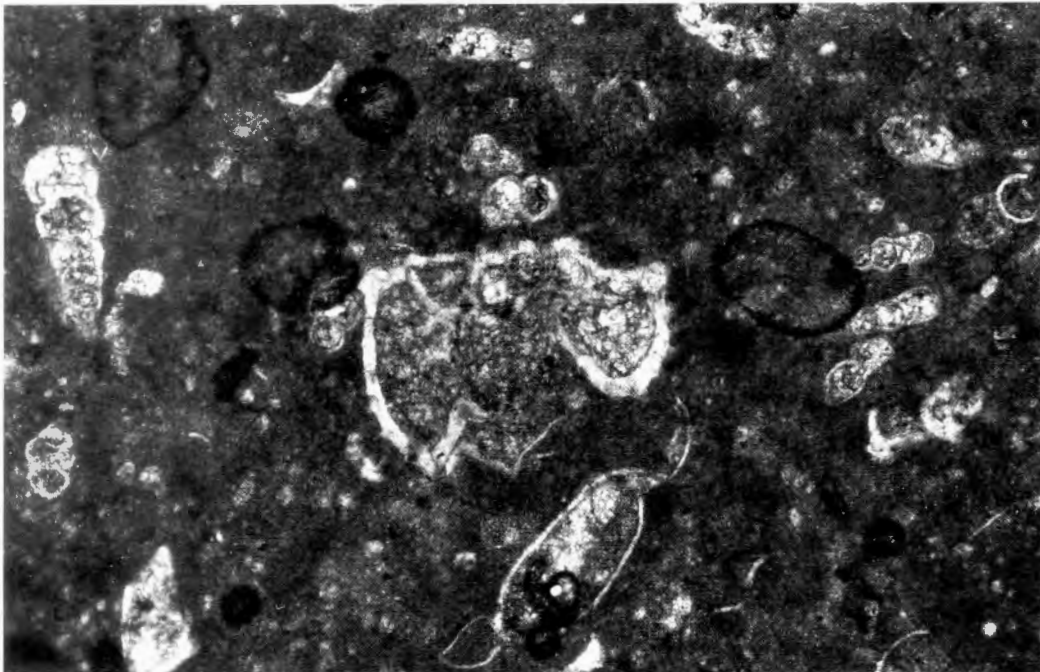
NEOCOMIAN							SENONIAN			
BERRIASIAN	VALANGINIAN	HAUTERVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN	CAMPANIAN
										MAASTRICHTIAN

Multiserial *Heterohelicidae* are typical of the MAASTRICHTIAN.



Globotruncana (Globotruncanita) conica WHITE (X 90).
MAASTRICHTIAN of Monte Conero,
Marche, Italy.

NEOCOMIAN								SENONIAN			
BERRIASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN	CAMPANIAN	MAASTRICHTIAN



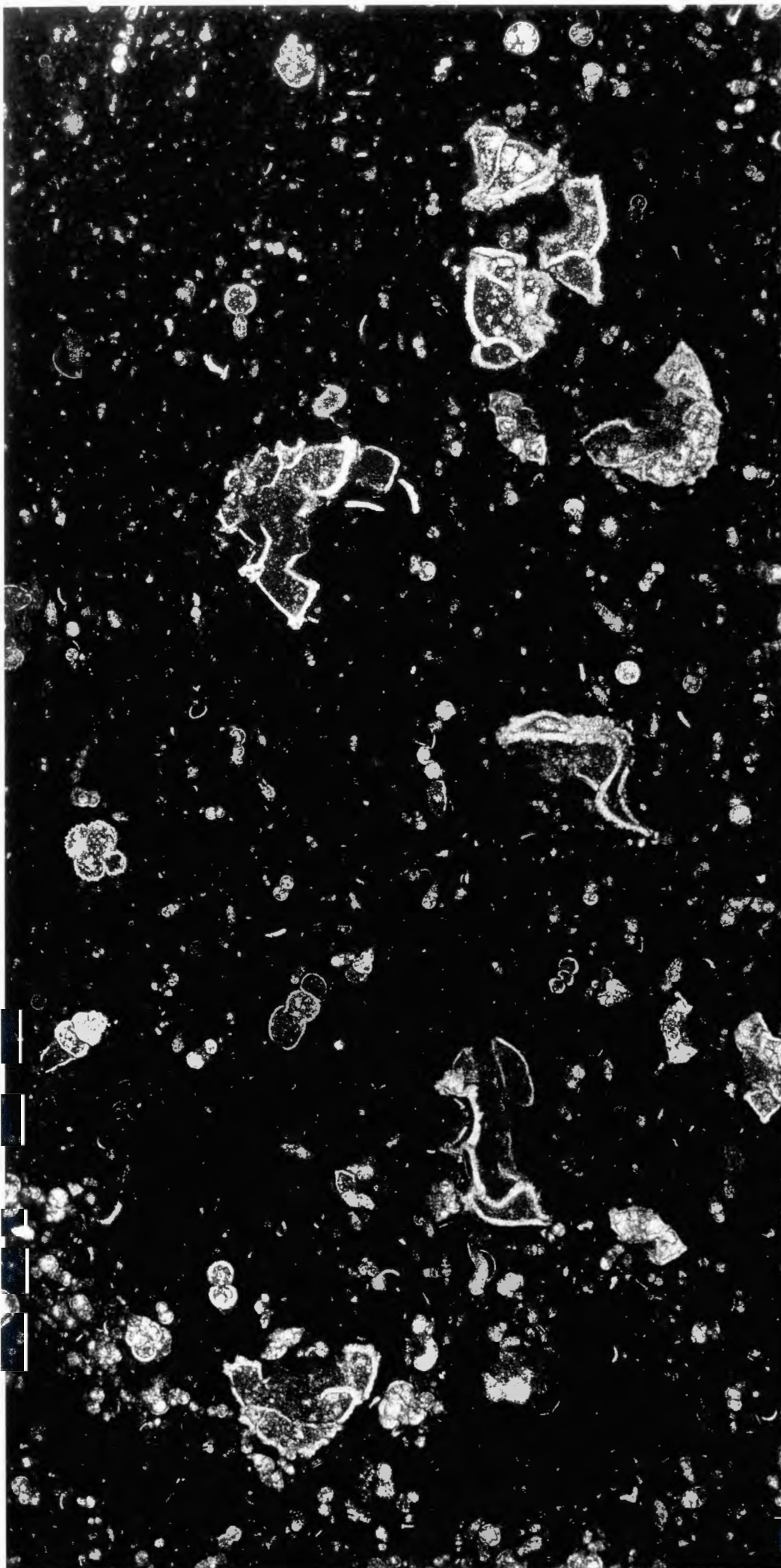
Globotruncana (Gansserina) gansseri (BOLLI) (X 80).
MAASTRICHTIAN of Piropo 2 well,
Adriatic Sea.

NEOCOMIAN								SENONIAN			
BERRIASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN	CAMPANIAN	MAASTRICHTIAN



Abathomphalus mayaroensis (BOLLI) (X 100).
UPPER MAASTRICHTIAN of Carcoselle,
Venetia, Italy.

NEOCOMIAN								SENONIAN			
BERRIASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN	SANTONIAN	CAMPANIAN	MAASTRICHTIAN



Globotruncana (Rosita) contusa (CUSHMAN)
(X 40).

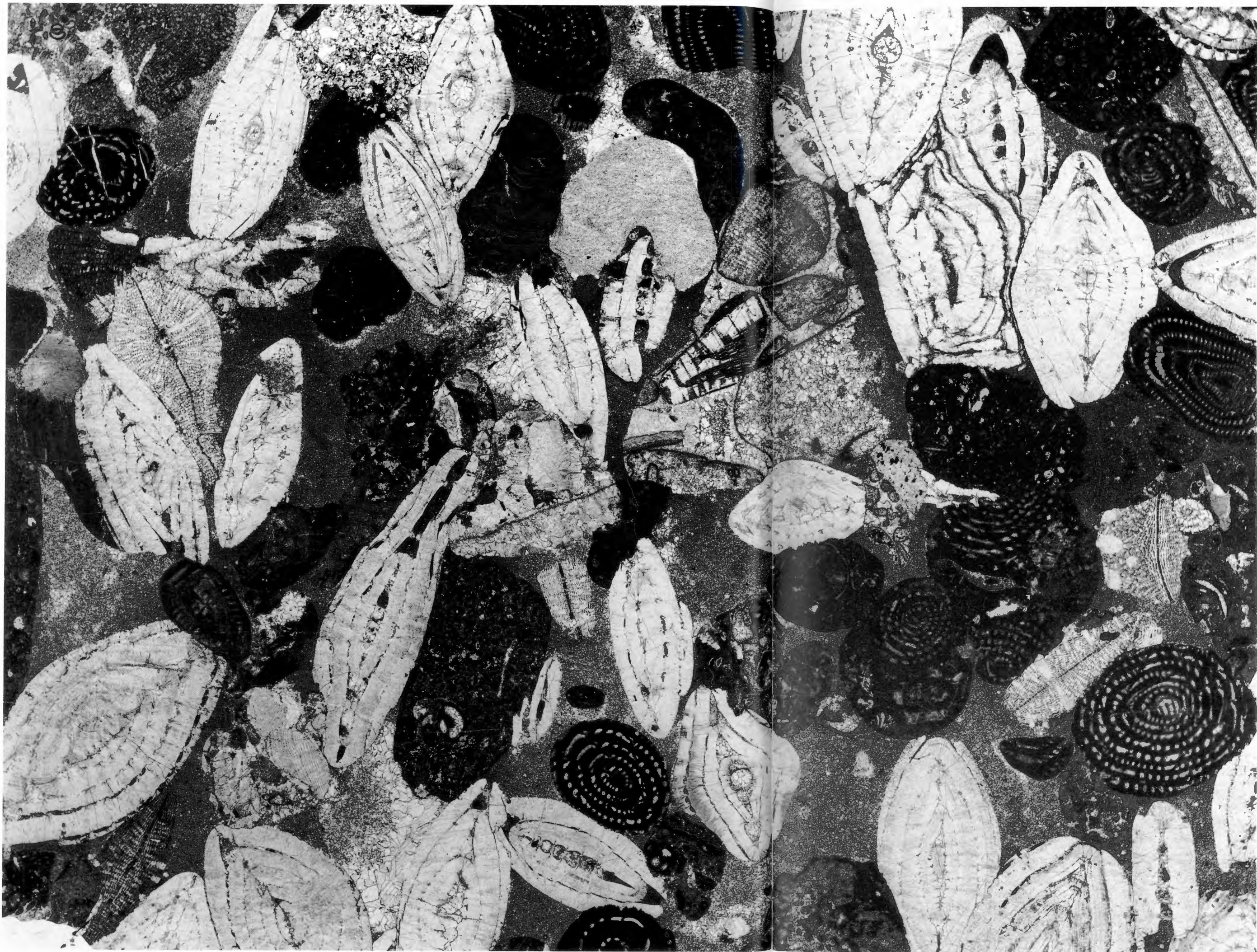
MIDDLE-UPPER MAASTRICHTIAN of
Monte Conero, Marche, Italy.

Details from Monte Conero, Marche
(X 60) (above) and Piroppo 2 well, Adriatic
Sea (X 60) (below).

NEOCOMIAN								SENONIAN				
BERRIASIAN	VALANGINIAN	HAUTERIVIAN	BARREMIAN					APTIAN	ALBIAN	CENOMANIAN	TURONIAN	CONIACIAN

This is a typical high-trochospiral form of the
MIDDLE-LATE MAASTRICHTIAN.





CENOZOIC

EPOCHS & AGES					
Agip		Ma	Haq et Al. 1987 (modified)		Ma
PLEISTOCENE		0	PLEISTOCENE		0
PLIOCENE		1.62	PLIOCENE		1.65
MIOCENE	LATE	5.4	LATE	MESSINIAN	5.2
				TORTONIAN	6.3
	MIDDLE	12.6	MIDDLE	SERRAVALLIAN	10.2
		15.25		LANGHIAN	15.2
	EARLY		EARLY	BURDIGALIAN	16.2
		AQUITANIAN		20	
OLIGOCENE	LATE	23	OLIGOCENE	LATE	25.2
	MIDDLE	27.8		CHATTIAN	
	EARLY	31		EARLY	30
EOCENE	LATE	35.7	EOCENE	LATE	36
	MIDDLE	39.2		PRIABONIAN	39.4
				BARTONIAN	42
				LUTETIAN	
	EARLY	52		EARLY	48.5
PALEOCENE	LATE	57	PALEOCENE	LATE	54
	MIDDLE	61		THANETIAN	
	EARLY	63.4		EARLY	60.2
		66.4		DANIAN	
					66.5

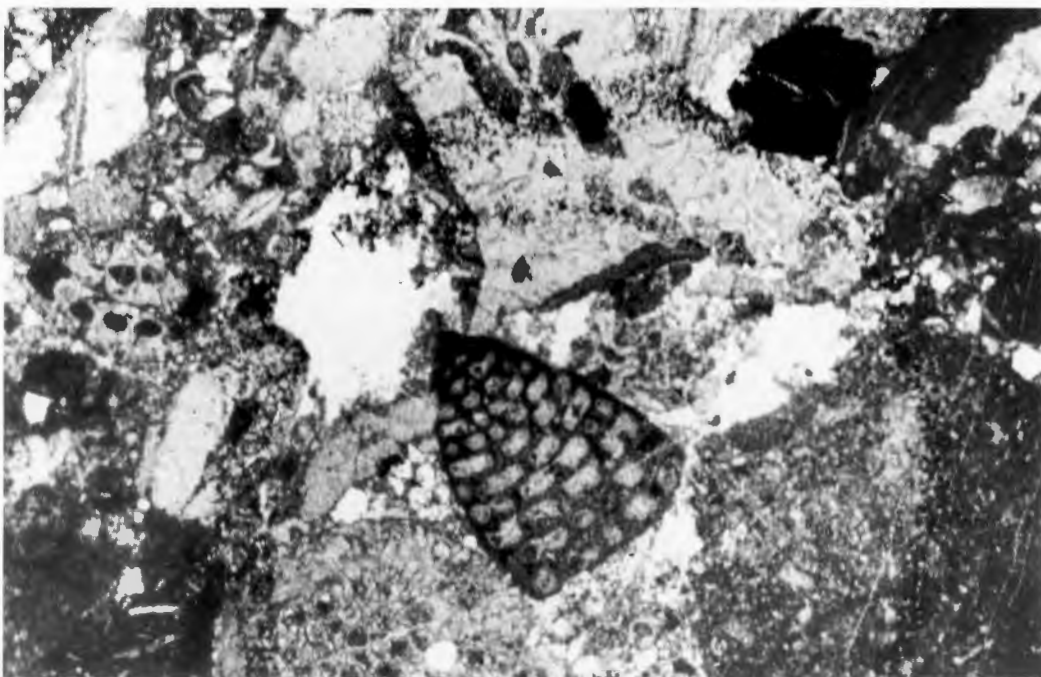


COLL.: EARTH SCIENCES DEP. UNIV. OF MILAN

Coskinolina (Coskinon) rajkae HOTTINGER & DROBNE. *Fallotella alavensis* MANGIN, *Miliolidae*, *Ophthalmidiidae* and algae are present (X 15). Detail (X 30). PALEOCENE of Laže, Istria, Yugoslavia.

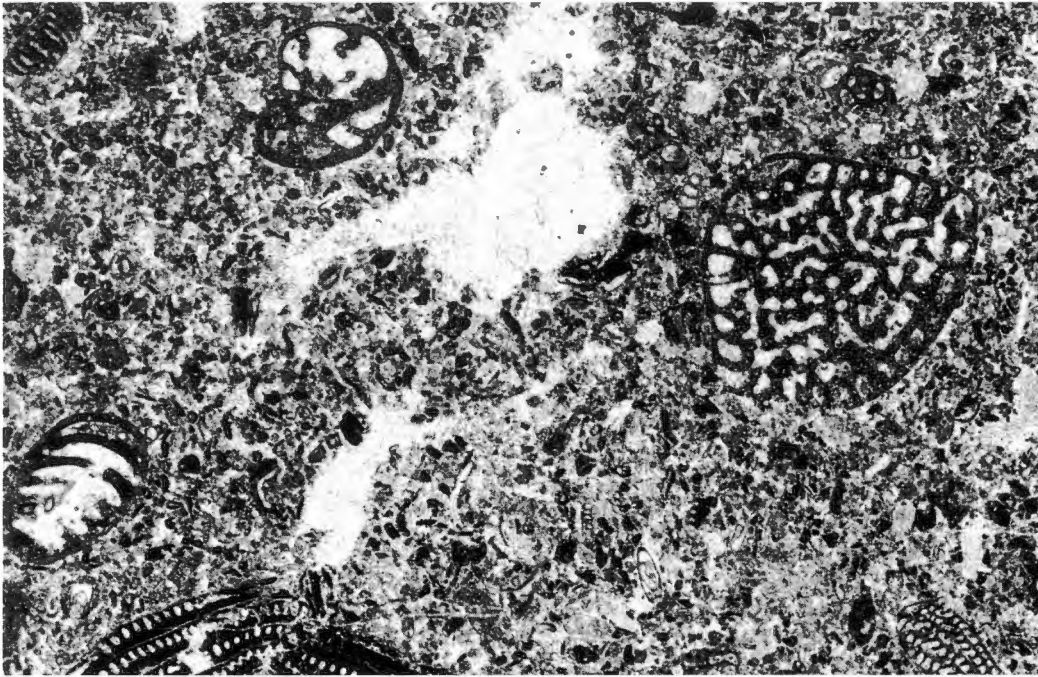
PALEOCENE			EOCENE			OLIGOCENE			MIOCENE			PLIOCENE	PLEISTOCENE
E.	M.	L.	E.	M.	L.	E.	M.	L.	E.	M.	L.		

These conical imperforate foraminifera including *Coskinolina*, *Fallotella* and *Dictyoconus* genera are typical of inner facies of the PALEOCENE and EARLY-MIDDLE EOCENE.



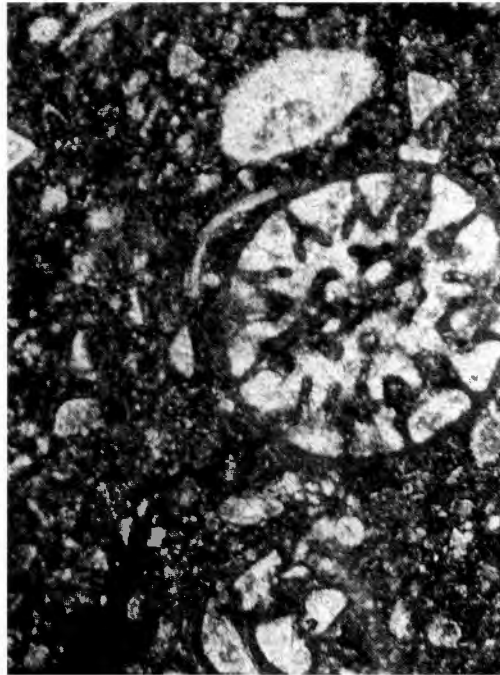
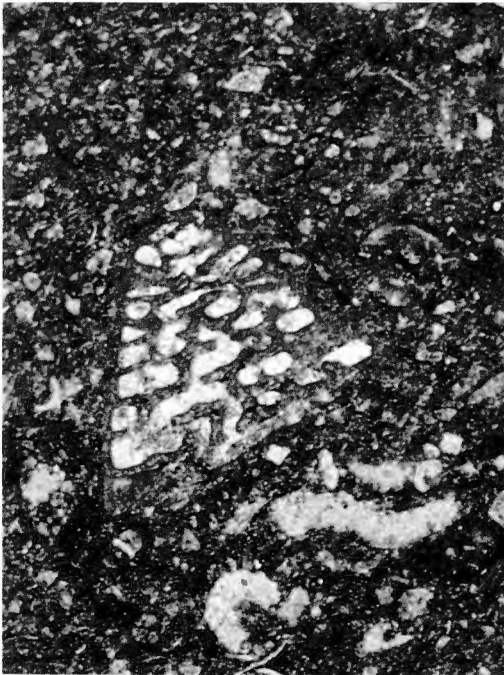
Fallotella (Fallotella) alavensis MANGIN (tangential section) (X 30). PALEOCENE, reworked in LOWER EOCENE of Albana, Friuli, Italy.

PALEOCENE			EOCENE			OLIGOCENE			MIOCENE			PLIOCENE	PLEISTOCENE
E.	M.	L.	E.	M.	L.	E.	M.	L.	E.	M.	L.		



Coskinolina (Coskinolina) liburnica STACHE (X 25).
LOWER EOCENE of Ravni Kotari, Yugoslavia.
Detail from HOTTINGER & DROBNE-1980 (X 20).

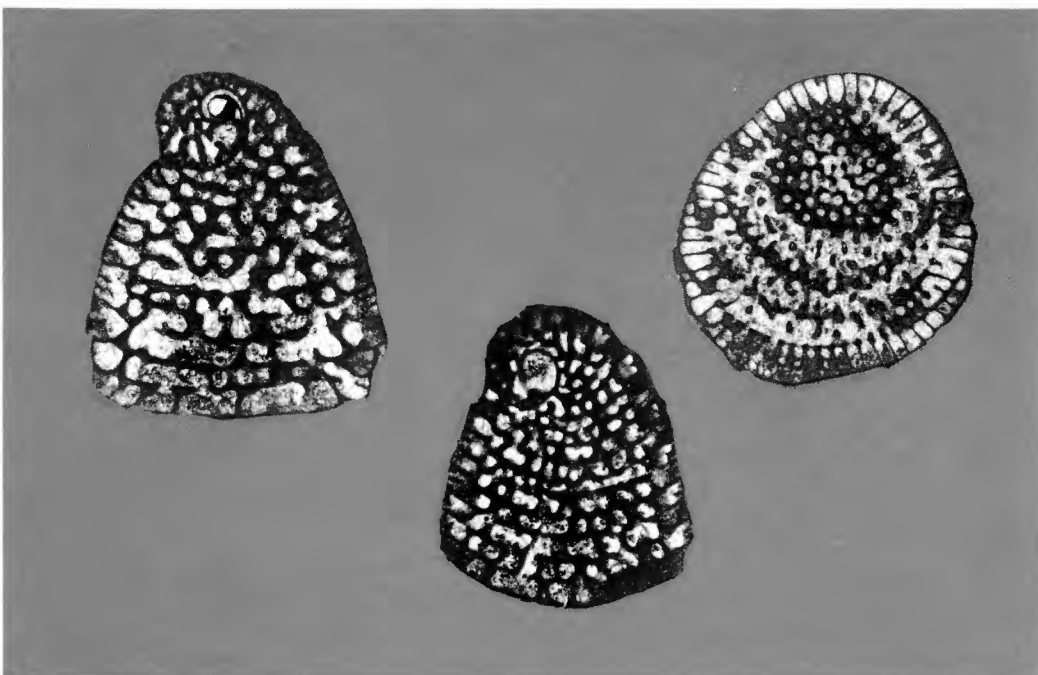
PALEOCENE			EOCENE			OLIGOCENE			MIOCENE			PLIOCENE	PLEISTOCENE
E.	M.	L.	E.	M.	L.	E.	M.	L.	E.	M.	L.		



Fallotella (Daviesiconus) balsilliei (DAVIES) (X 40) (left).
MIDDLE EOCENE of Ras Ghashwah 2X bis well, P.D.R. of Yemen.

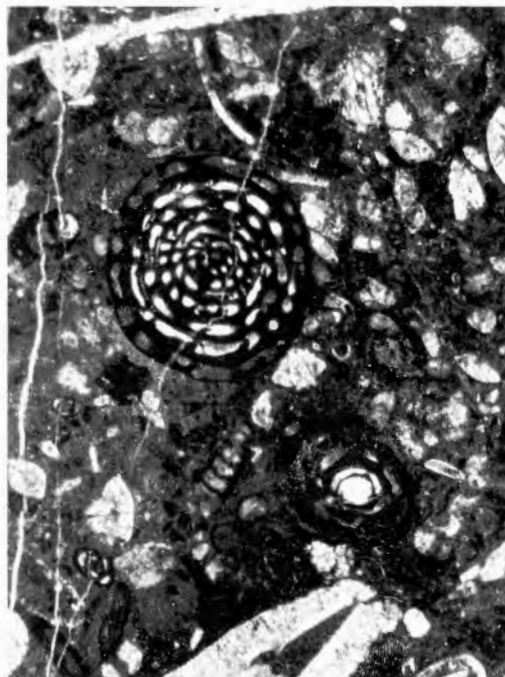
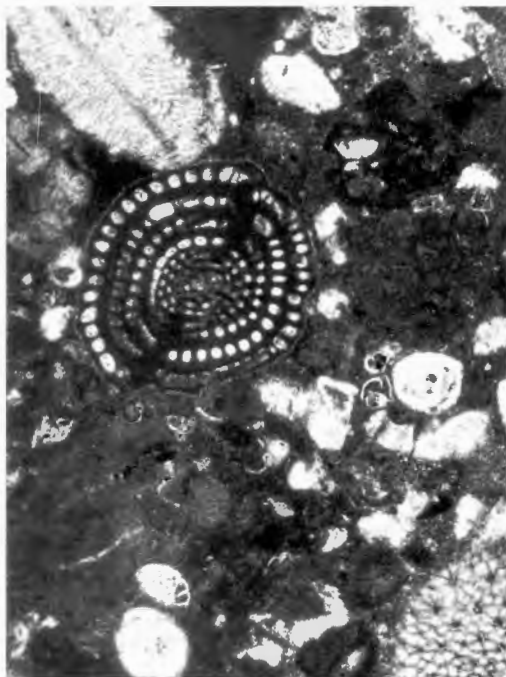
Fallotella balsilliei (DAVIES) (X 40) (right).
MIDDLE EOCENE of Ras Ghashwah 2X bis well, P.D.R. of Yemen.

PALEOCENE			EOCENE			OLIGOCENE			MIOCENE			PLIOCENE	PLEISTOCENE
E.	M.	L.	E.	M.	L.	E.	M.	L.	E.	M.	L.		



Dictyoconus (Dictyoconus) egyptiensis (CHAPMAN) (X 20).
MIDDLE EOCENE of B1-82 well, Sirte Basin.

PALEOCENE			EOCENE			OLIGOCENE			MIOCENE			PLIOCENE	PLEISTOCENE
E.	M.	L.	E.	M.	L.	E.	M.	L.	E.	M.	L.		



Alveolina (*Glomalveolina*) gr. *primaeva* (REICHEL) (X 25) (left).
PALEOCENE of Siracusa 1 well, Sicily, Italy.

Alveolina (*Glomalveolina*) gr. *primaeva* (REICHEL) (X 20) (right).
PALEOCENE of Golž, Yugoslavia.

PALEOCENE			EOCENE			OLIGOCENE			MIOCENE			PLIOCENE	PLEISTOCENE
E.	M.	L.	E.	M.	L.	E.	M.	L.	E.	M.	L.		



Alveolina (X 7).
UPPER PALEOCENE of Golž, Yugoslavia.

PALEOCENE			EOCENE			OLIGOCENE			MIOCENE			PLIOCENE	PLEISTOCENE
E.	M.	L.	E.	M.	L.	E.	M.	L.	E.	M.	L.		

The *Alveolina* assemblages of the LATE PALEOCENE mainly consist of spherical, ovoidal and subcylindrical flosculinized forms.



Alveolina, *Nummulites* and *Orbitolites* are present (X 5).
LOWER EOCENE of Golž, Yugoslavia.

Large cylindrical and fusiform *Alveolina* are characteristic of EARLY EOCENE micropaleontological assemblages.

Opposite page
Alveolina, *Miliolidae*, *Discocyclina*, *Rotaliidae*, *Valvulininae* and algae (X 15).
LOWER EOCENE of Monte Postale, Venetia, Italy.





Alveolina, *Miliolidae*, *Coskinolina*,
Chrysalidina and *Orbitolites* (X 15).
LOWER EOCENE of Benkovac,
Yugoslavia.

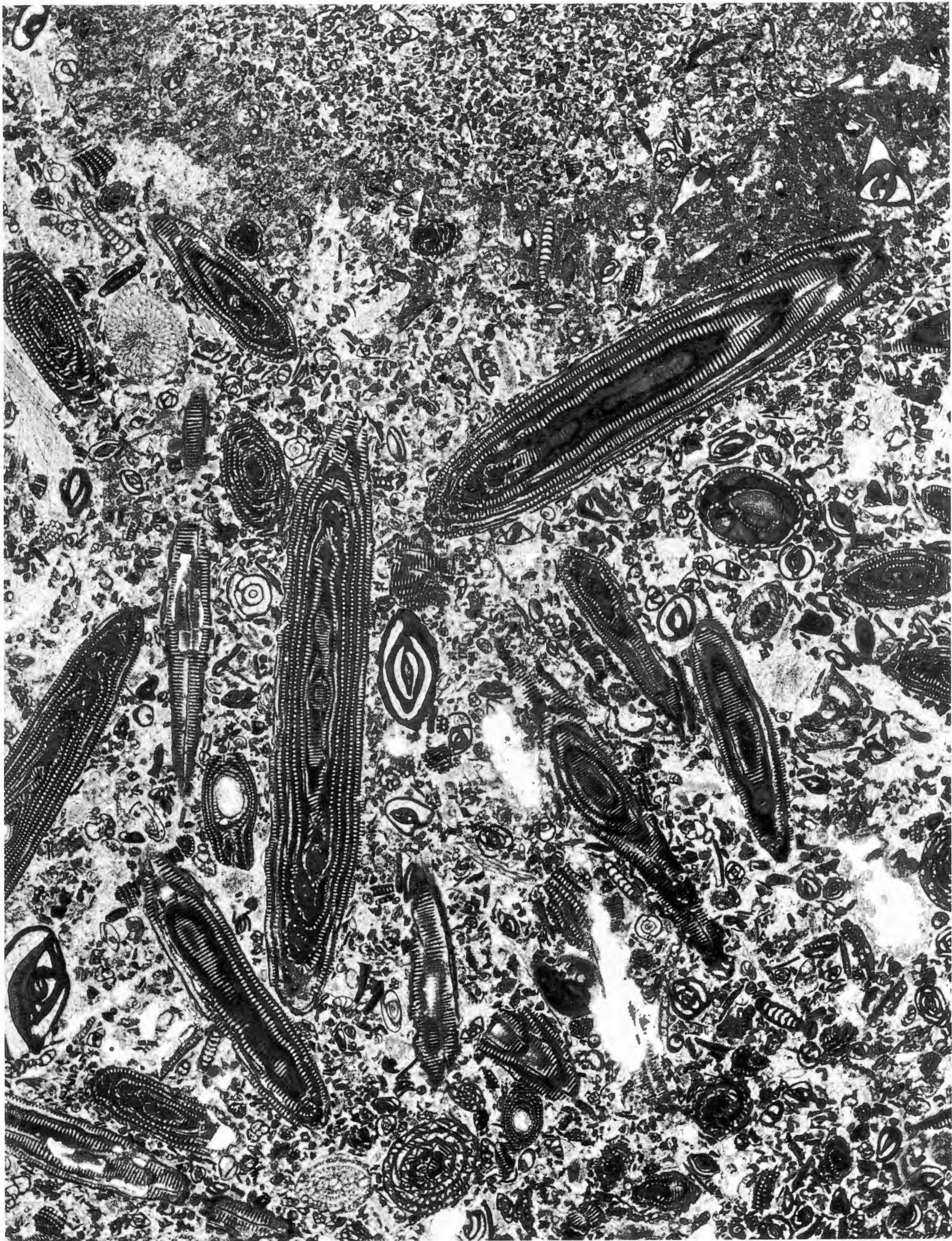


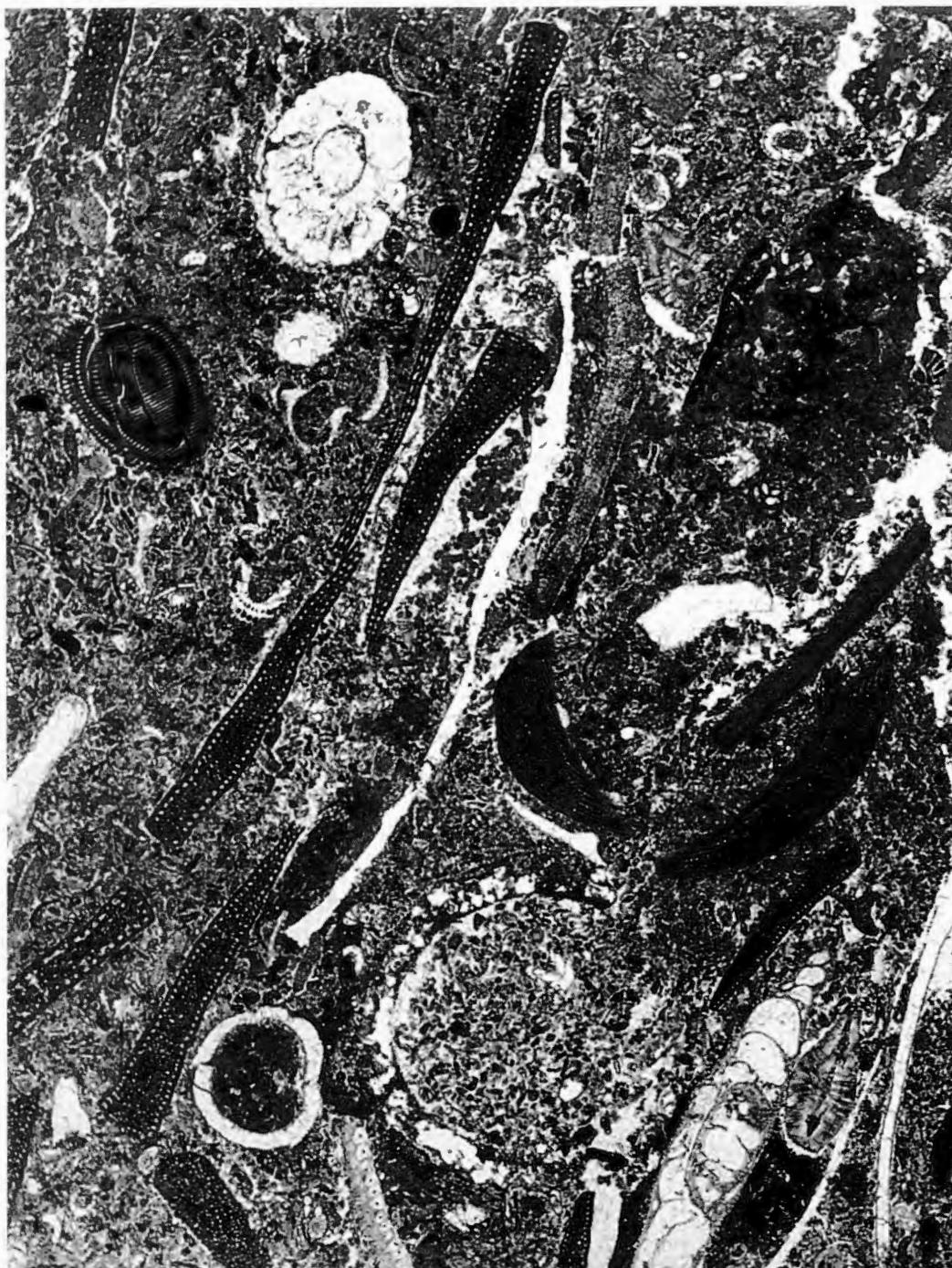
Alveolina (X 7).
MIDDLE EOCENE of Tang-e-Karsondun,
Zagros, Iran.

Supplementary passages appearing in the middle
part of the EARLY EOCENE are a typical feature of
Alveolina assemblages of the MIDDLE EOCENE.

Opposite page
Alveolina, *Nummulites*, *Spirolina*,
Eorupertia, *Miliolidae* and *Ophthalmidiidae*
(X 12).
MIDDLE EOCENE of Tang-e-Karsondun,
Zagros, Iran.

Very elongated subcylindrical and fusiform *Alveolina*
appear in the upper part of the EARLY EOCENE.





Saudia labyrinthica GRIMSDALE. *Alveolina*, *Miscellanea*, *Ranikothalia* and algae are present (X 5).
UPPER PALEOCENE of Sagaleh 1 well, Somaliland.

PALEOCENE			EOCENE			OLIGOCENE			MIOCENE			PLIOCENE	PLEISTOCENE
E.	M.	L.	E.	M.	L.	E.	M.	L.	E.	M.	L.		

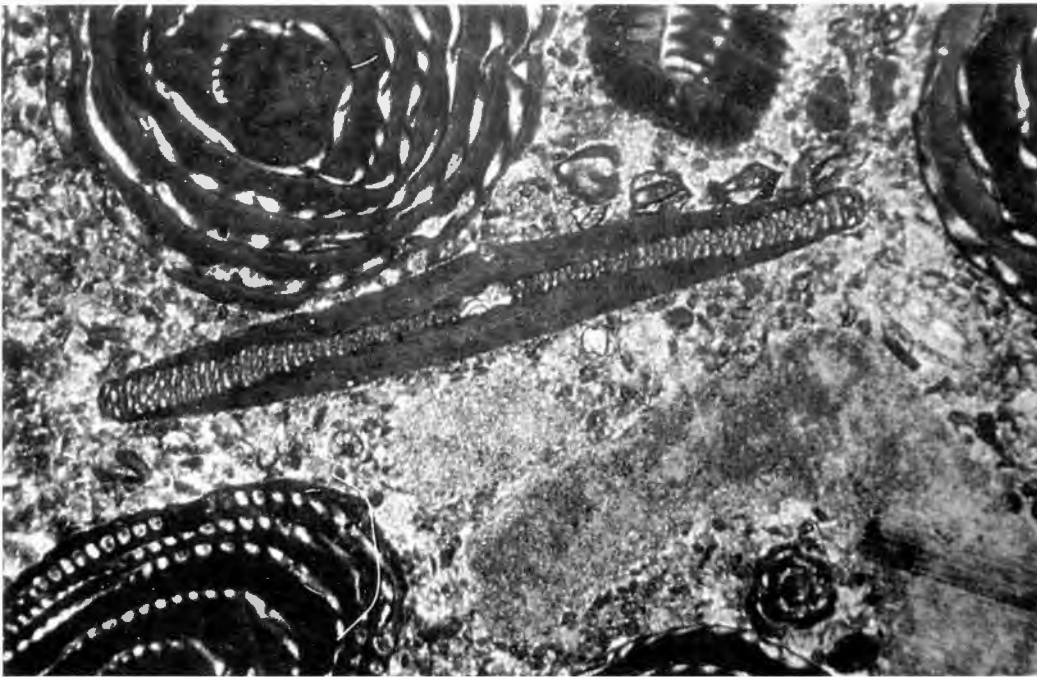
This form is common mainly in East Africa and in the Middle East.



Somalina. *Alveolina* and *Miliolidae* are present (X 10).
LOWER EOCENE of Hoda Mountain, Somaliland

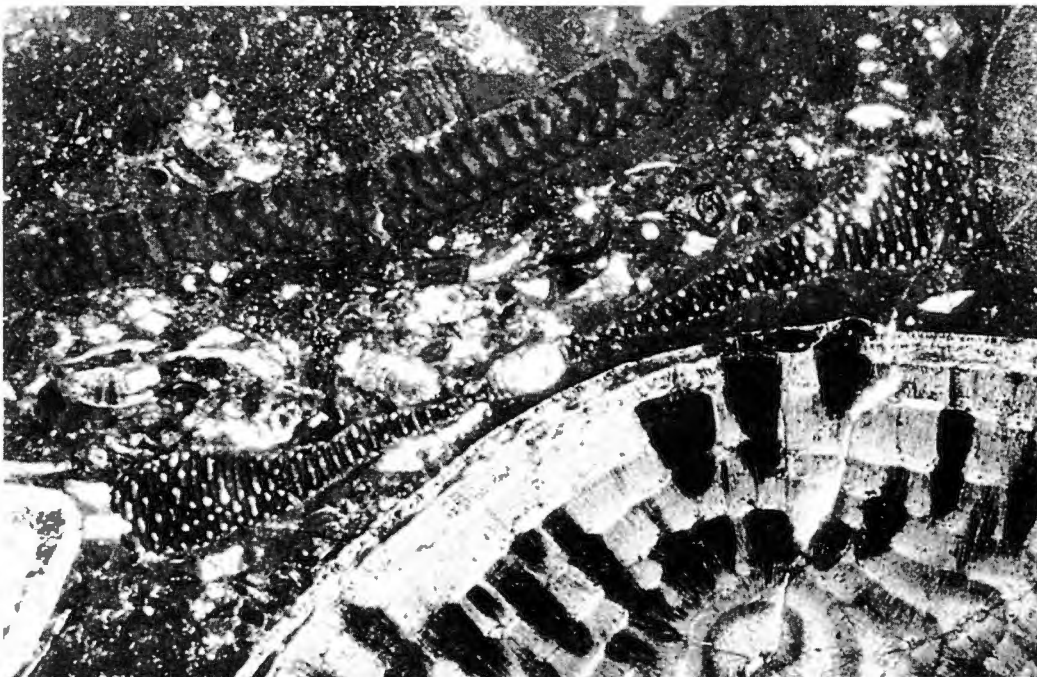
PALEOCENE			EOCENE			OLIGOCENE			MIOCENE			PLIOCENE	PLEISTOCENE
E.	M.	L.	E.	M.	L.	E.	M.	L.	E.	M.	L.		

This genus is widespread in Egypt, the Middle East and East Africa.



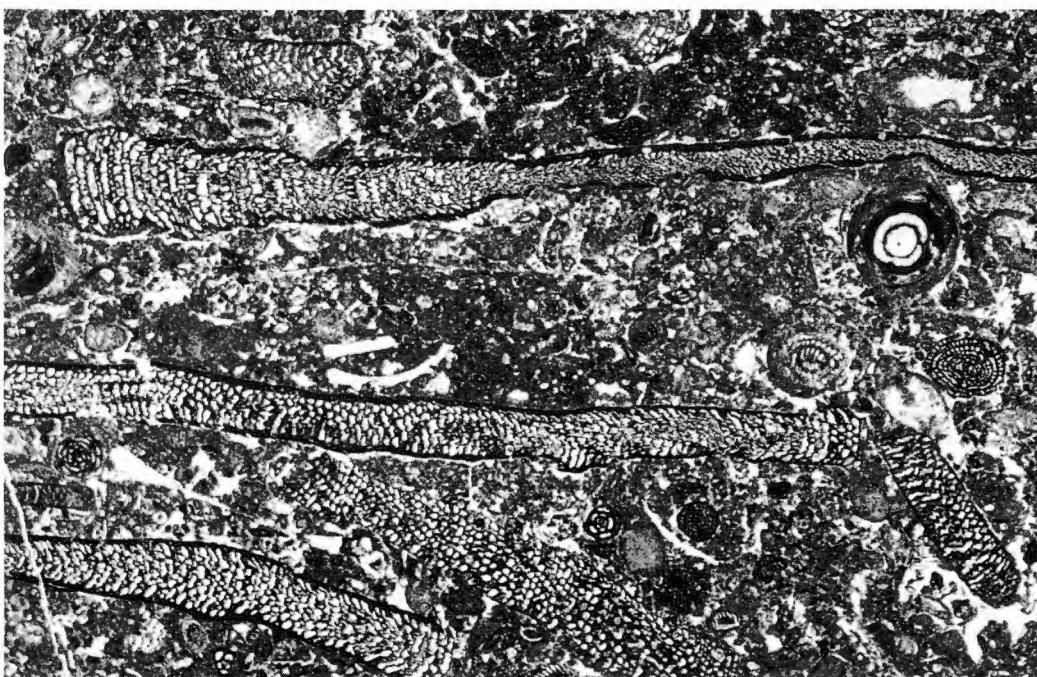
Opertorbitolites. *Alveolina* and *Miliolidae* are present (X 20).
UPPER PALEOCENE of Golž, Yugoslavia.

PALEOCENE			EOCENE			OLIGOCENE			MIOCENE			PLIOCENE	PLEISTOCENE
E.	M.	L.	E.	M.	L.	E.	M.	L.	E.	M.	L.		



Orbitolites. *Nummulites* is also present (X 20).
MIDDLE EOCENE of Pachino, Sicily, Italy.

PALEOCENE			EOCENE			OLIGOCENE			MIOCENE			PLIOCENE	PLEISTOCENE
E.	M.	L.	E.	M.	L.	E.	M.	L.	E.	M.	L.		

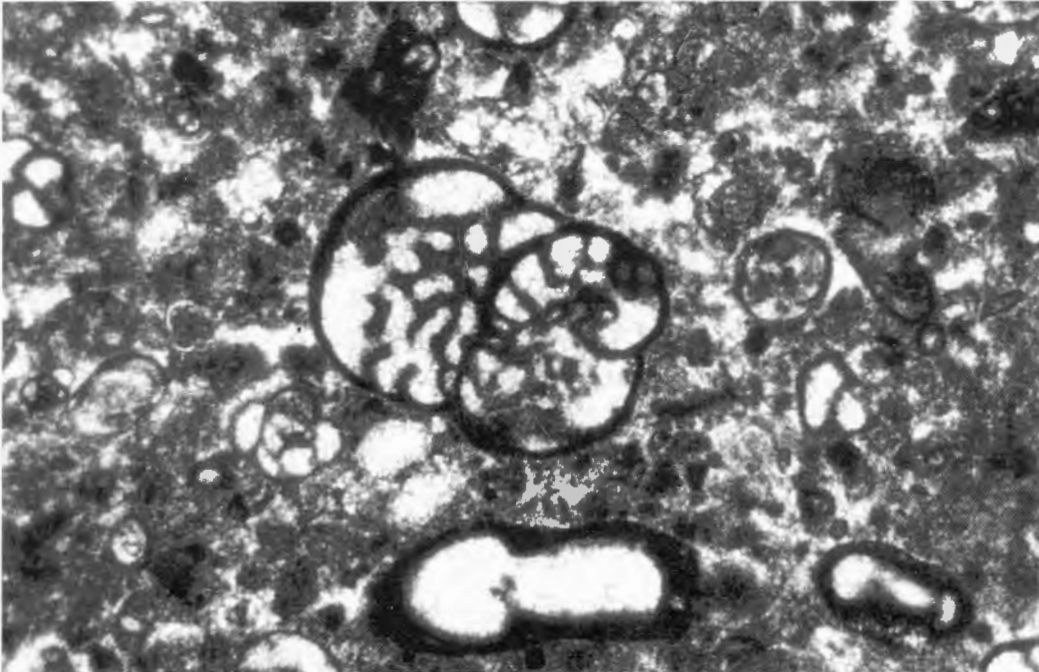


Orbitolites. *Alveolina* and *Miliolidae* are present (X 10).
LOWER EOCENE of Tang-e-Kelureh, Zagros, Iran.

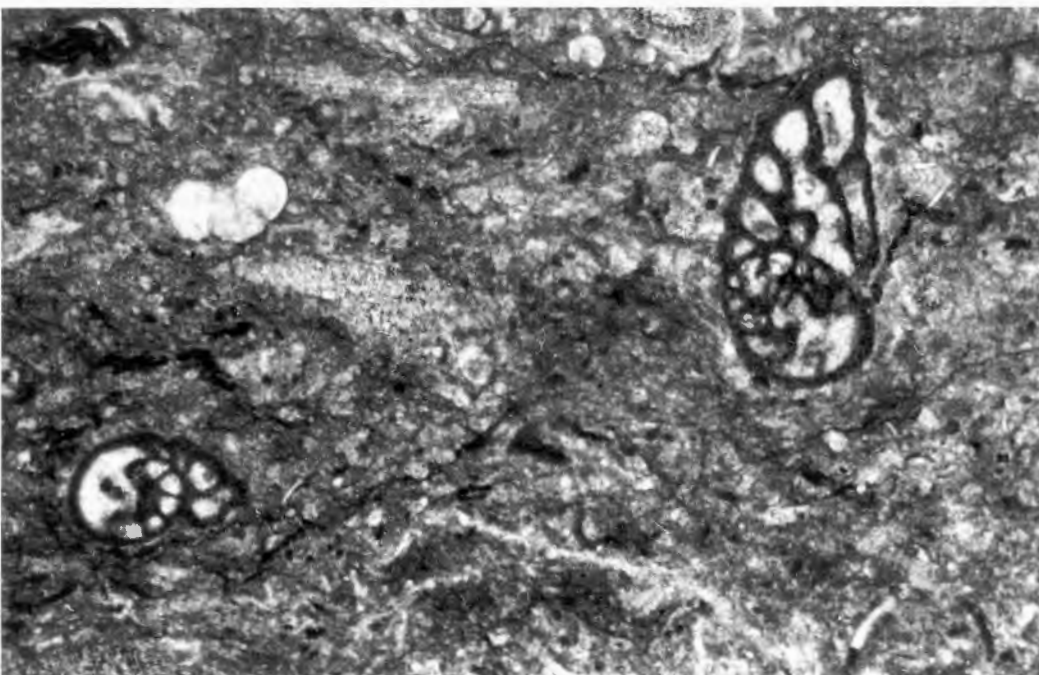


Cribrobulimina (X 30).
LOWER EOCENE of Makarska,
Yugoslavia.

These forms belong to *Valvulininae* subfamily.
Valvulininae are common from the PALEOCENE to
the EOCENE.



Valvulininae (cf. *Chrysalidina*) (X 40).
EOCENE of Monte Spina, Basilicata, Italy.



Valvulininae (cf. *Discorinopsis*) (X 30).
EOCENE of Lavello 1 well, Basilicata, Italy.



Rhapydionina. Valvulininae, Ophthalmidiidae and Miliolidae are present (X 12). Detail (X 25). MIDDLE EOCENE of Lavello 2 well, Basilicata, Italy.

PALEOCENE			EOCENE			OLIGOCENE			MIOCENE			PLIOCENE	PLEISTOCENE
E.	M.	L.	E.	M.	L.	E.	M.	L.	E.	M.	L.		

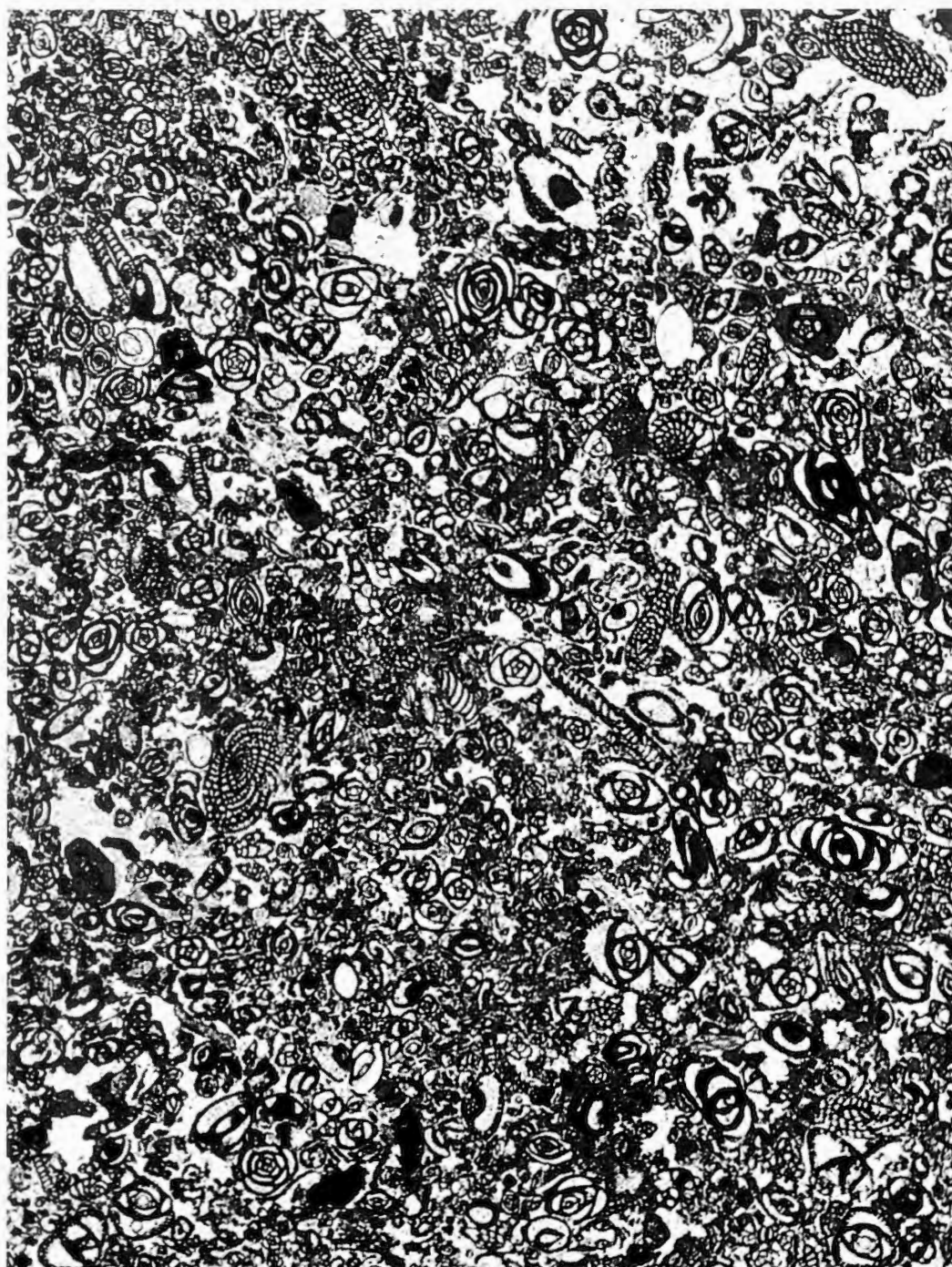
Rhapydionina is common during the MIDDLE EOCENE.



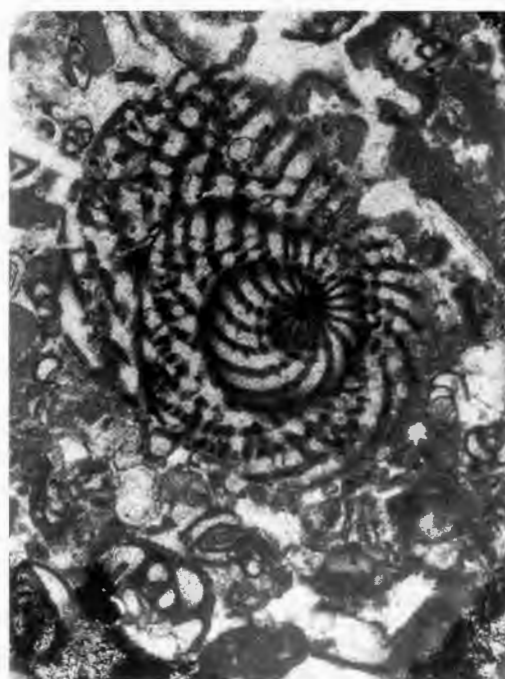
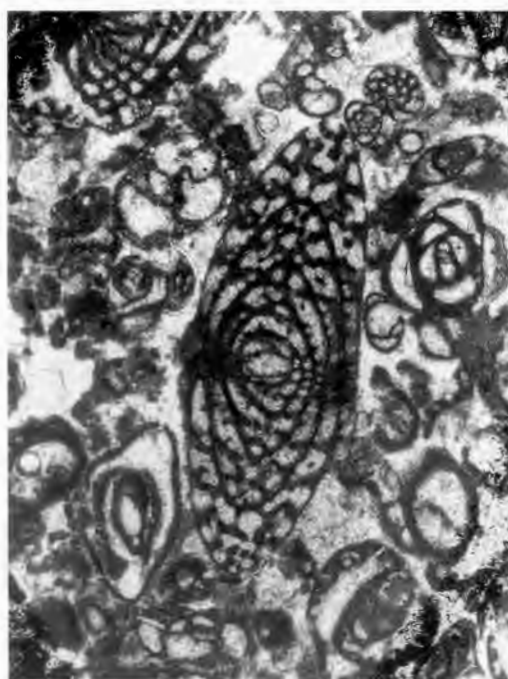
Praerhapydionina. Miliolidae and Ophthalmidiidae are present (X 18). LOWER OLIGOCENE of Lavello 5 well, Basilicata, Italy.

PALEOCENE			EOCENE			OLIGOCENE			MIOCENE			PLIOCENE	PLEISTOCENE
E.	M.	L.	E.	M.	L.	E.	M.	L.	E.	M.	L.		

Praerhapydionina is common from the LATE EOCENE to the EARLY MIOCENE.



Archaias, *Peneroplidae*, *Dendritina*,
Austrotrillina and *Miliolidae* (X 10).
LOWER OLIGOCENE of Tang-e-Salehat,
Zagros, Iran.



Archaias (X 30) (left).
LOWER OLIGOCENE of Tang-e-Salehat,
Zagros, Iran.

Archaias (X 30) (right).
LOWER OLIGOCENE of Tang-e-Salehat,
Zagros, Iran.

PALEOCENE			EOCENE			OLIGOCENE			MIOCENE			PLIOCENE	PLEISTOCENE
E.	M.	L.	E.	M.	L.	E.	M.	L.	E.	M.	L.		

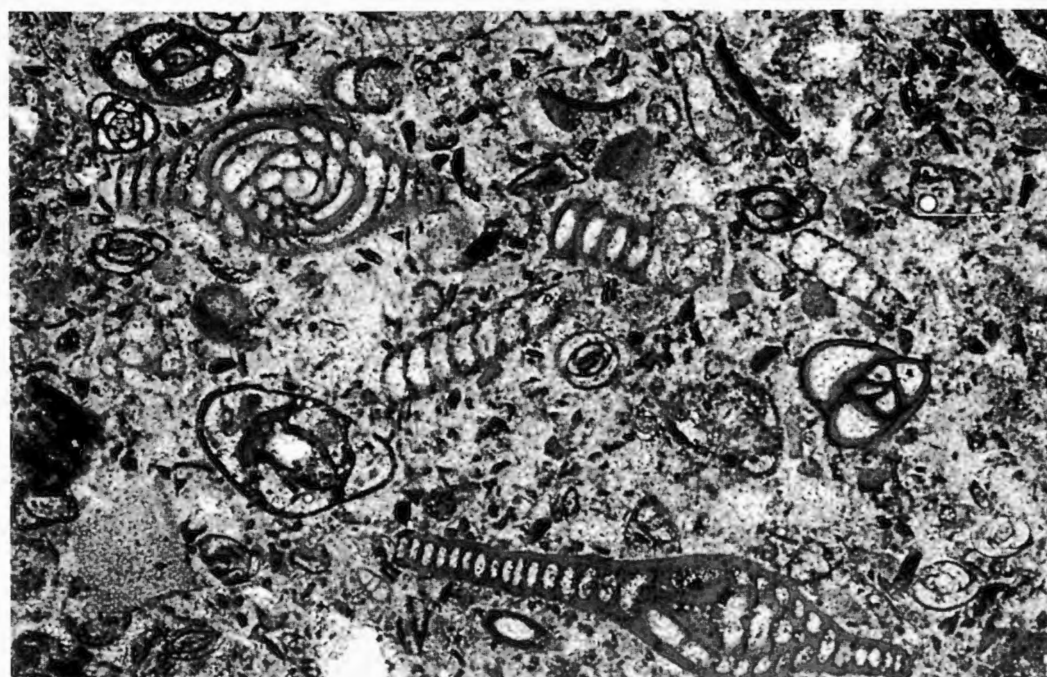


Pteropoda and *Miliolidae* are present (X 50).
MIDDLE OLIGOCENE of Tang-e-Kiskiasun, Zagros, Iran.

Facies with *Pteropoda* are common during the OLIGOCENE and in the EARLY MIOCENE.



Pteropoda (X 50).
MIDDLE OLIGOCENE of Tang-e-Kiskiasun, Zagros, Iran.

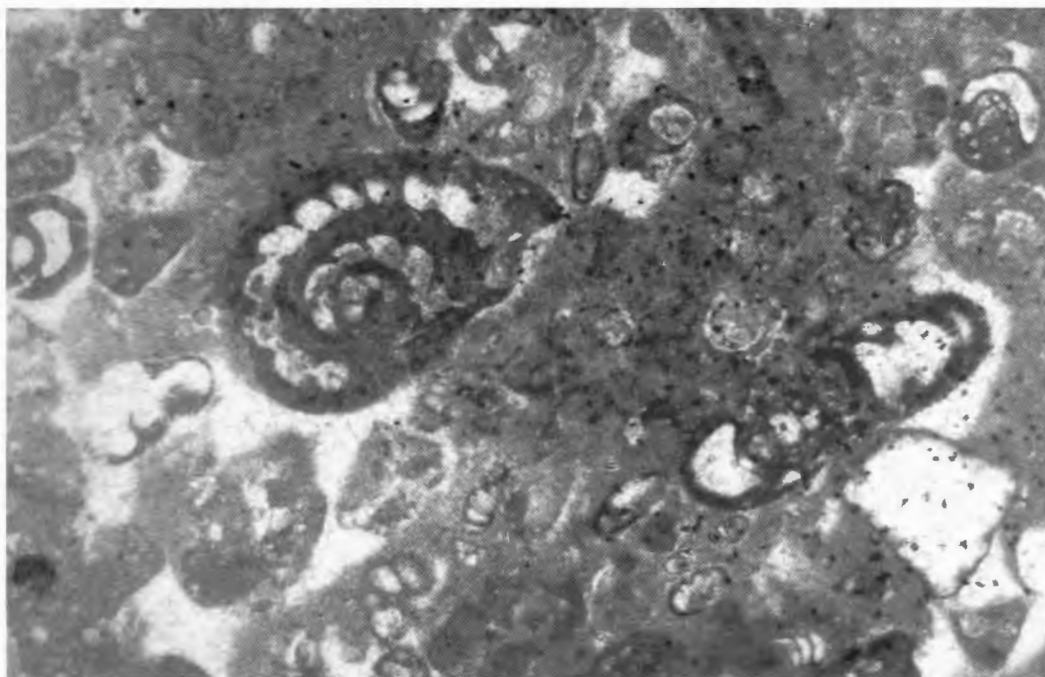


Pteropoda, *Spirolina*, *Austrotrillina* and *Miliolidae* (X 35).
UPPER OLIGOCENE of Salento, Apulia, Italy.



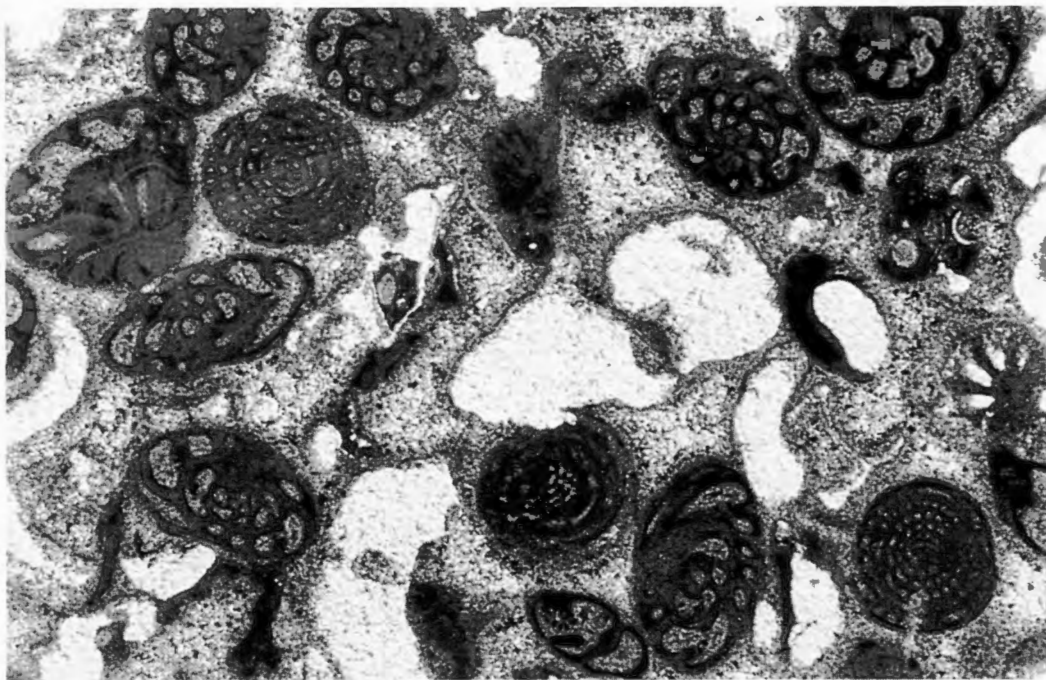
Austrotrillina, *Miliolidae* and *Dendritina* are present (X 60).
MIDDLE OLIGOCENE of Tang-e-Kiskiasun, Zagros, Iran.

PALEOCENE			EOCENE			OLIGOCENE			MIOCENE			PLIOCENE	PLEISTOCENE
E.	M.	L.	E.	M.	L.	E.	M.	L.	E.	M.	L.		



Dendritina (X 25).
MIDDLE-UPPER EOCENE of Lampione Island, Italy.

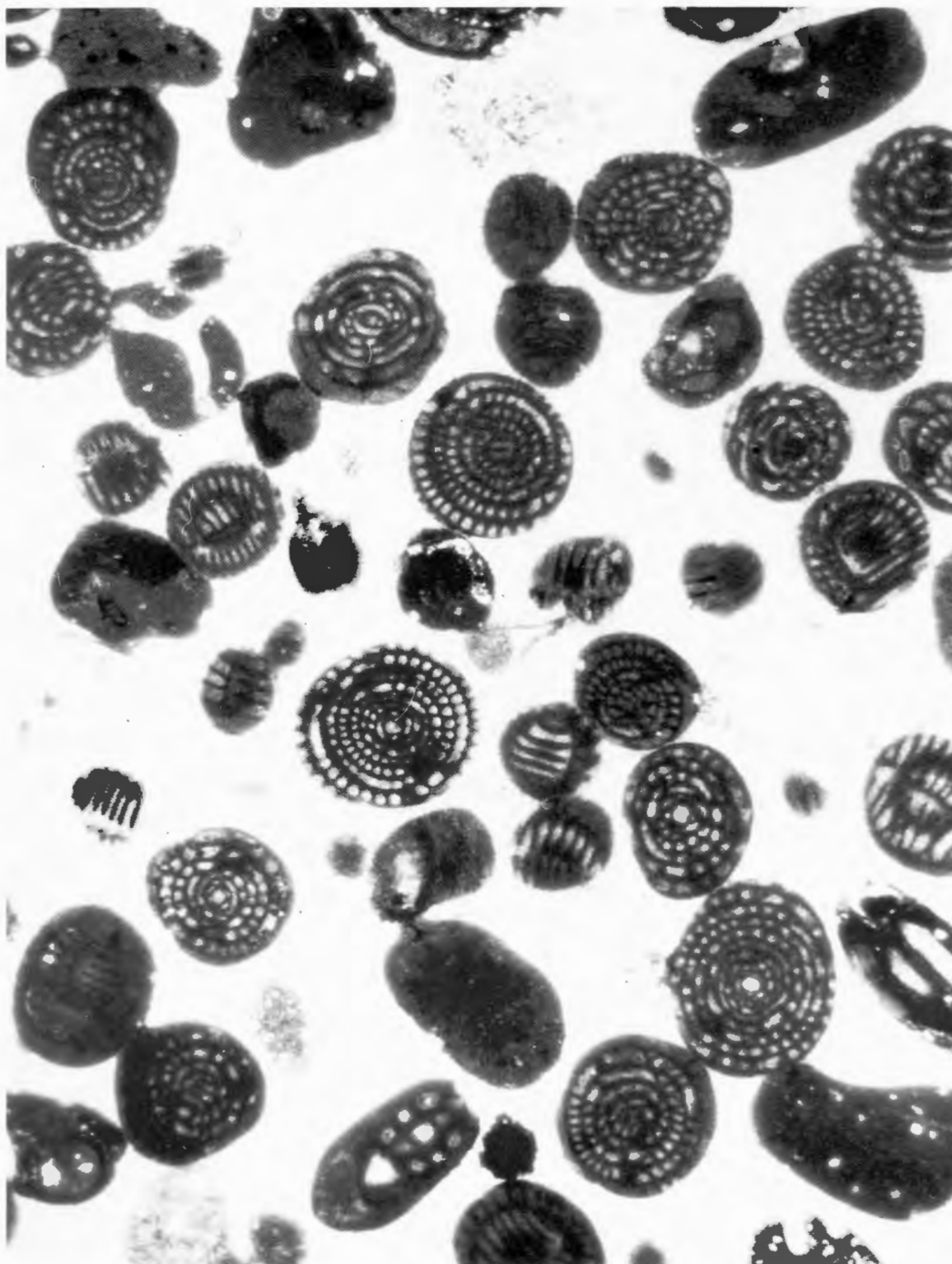
PALEOCENE			EOCENE			OLIGOCENE			MIOCENE			PLIOCENE	PLEISTOCENE
E.	M.	L.	E.	M.	L.	E.	M.	L.	E.	M.	L.		



Dendritina and *Borelis melo* (FICHTEL & MOLL) (X 35). Detail of *Dendritina* (X 50). MIDDLE MIOCENE of S. Cesarea Terme, Apulia, Italy.

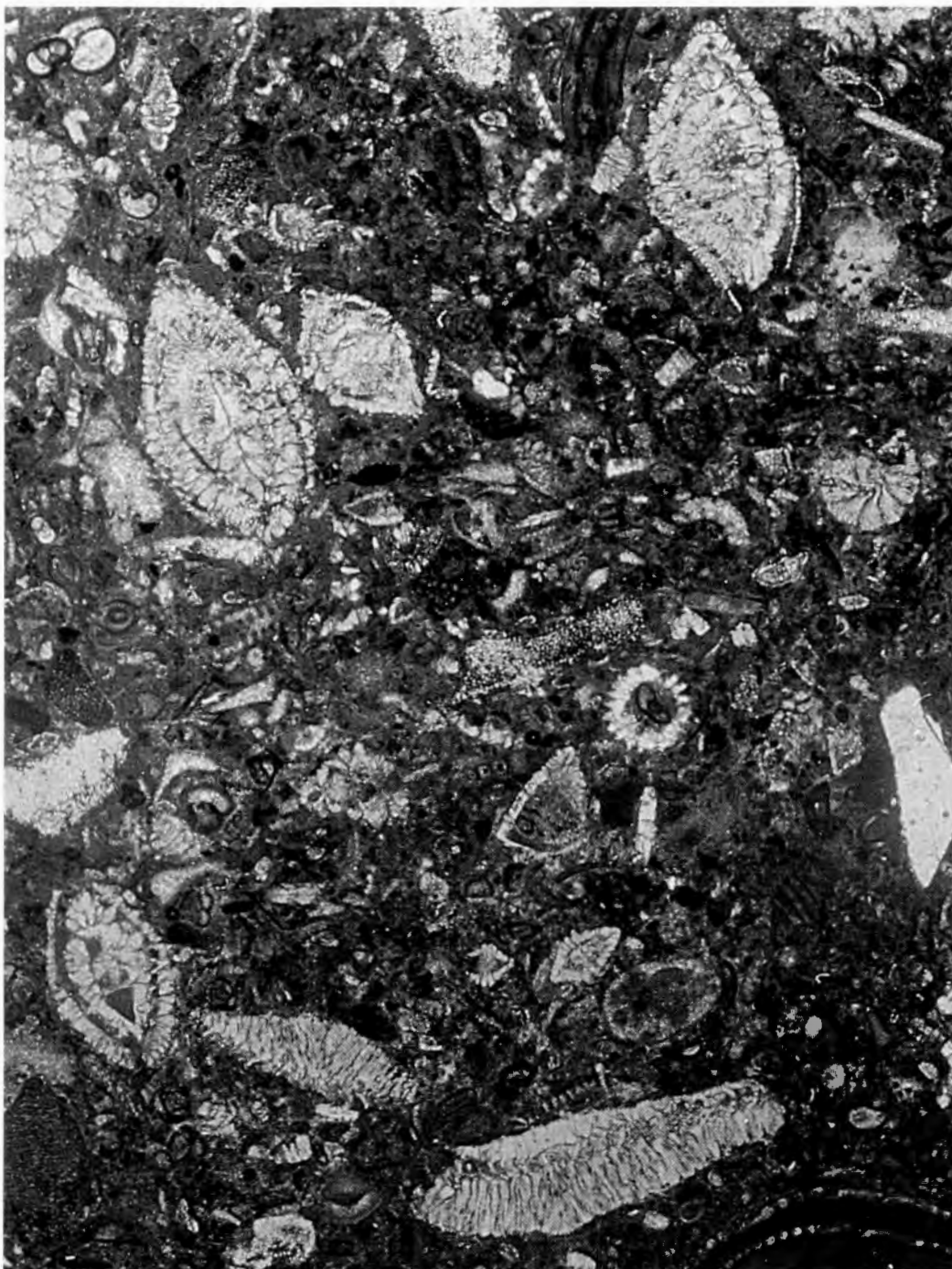


Borelis melo (FICHTEL & MOLL) (X 45). MIDDLE MIOCENE of El Abyar, Libya.



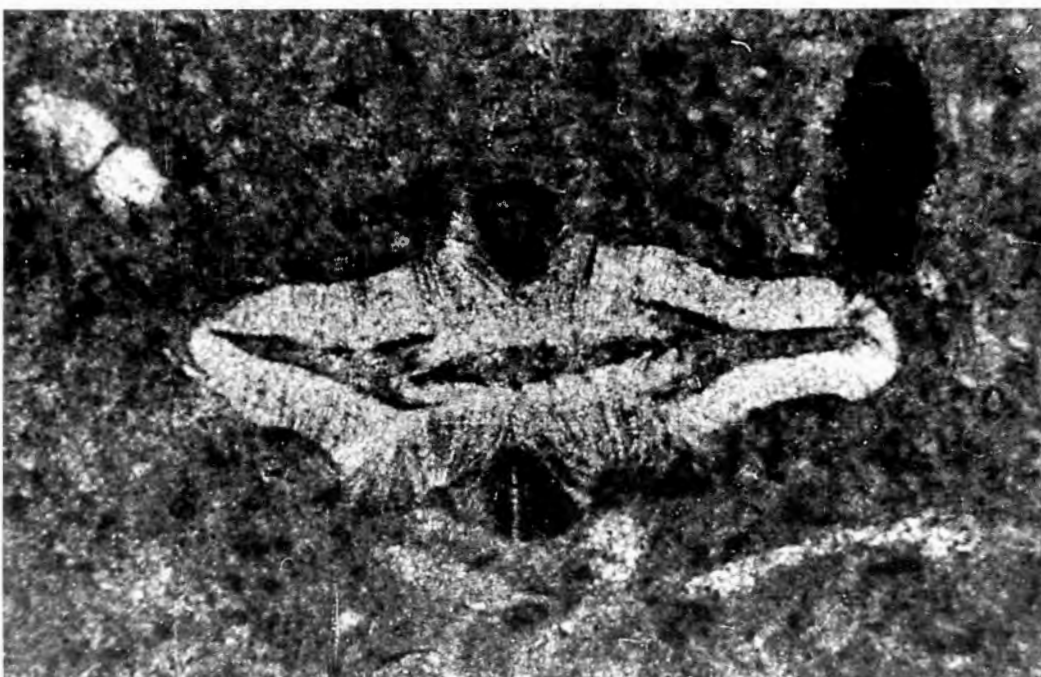
PALEOCENE			EOCENE			OLIGOCENE			MIOCENE			PLIOCENE	PLEISTOCENE
E.	M.	L.	E.	M.	L.	E.	M.	L.	E.	M.	L.		

Borelis gr. *melo* which includes *Borelis melo curdica* (REICHEL) is present from the EARLY to the LATE MIOCENE.



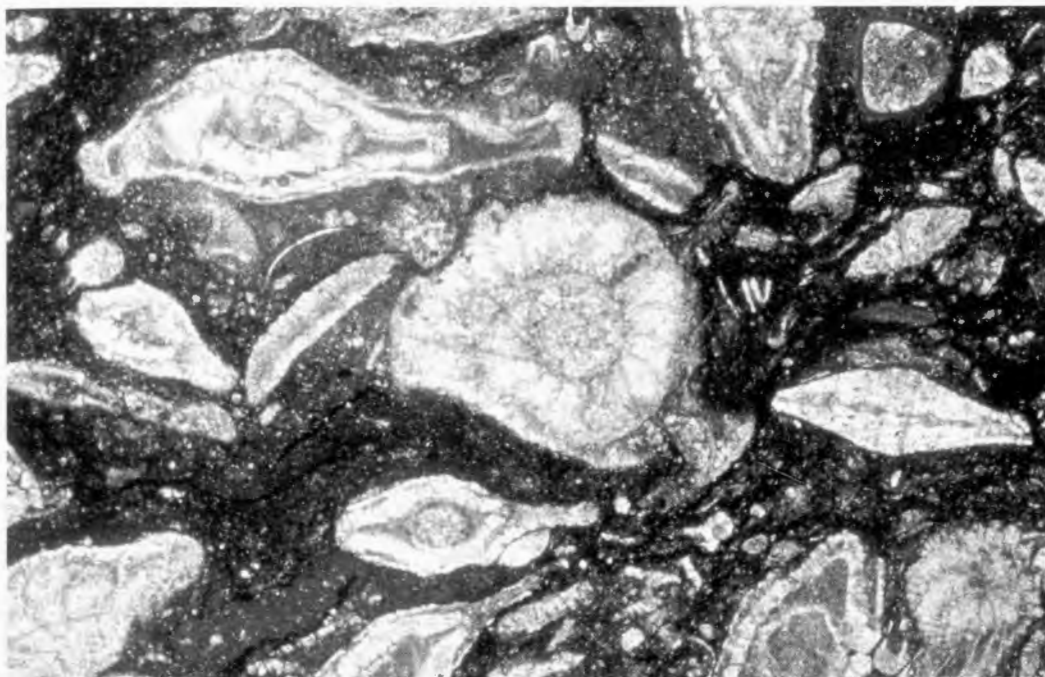
Miscellanea (X 20).
UPPER PALEOCENE of Seh Kuteh 1 well,
Zagros, Iran.

PALEOCENE			EOCENE			OLIGOCENE			MIOCENE			PLIOCENE	PLEISTOCENE
E.	M.	L.	E.	M.	L.	E.	M.	L.	E.	M.	L.		



Daviesina (X 40).
UPPER PALEOCENE of Wadi Shaqhawat,
P.D.R. of Yemen.

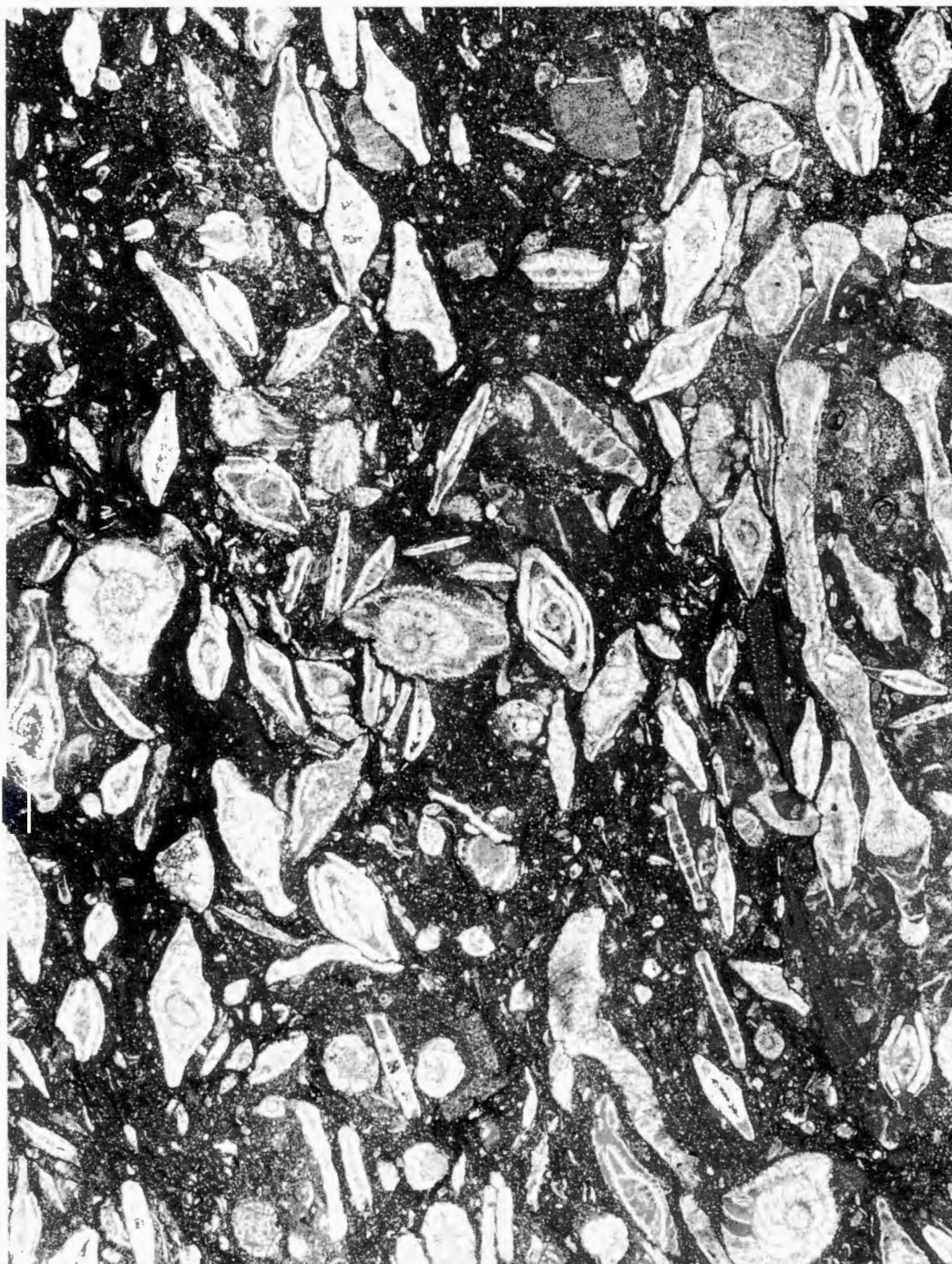
PALEOCENE			EOCENE			OLIGOCENE			MIOCENE			PLIOCENE	PLEISTOCENE
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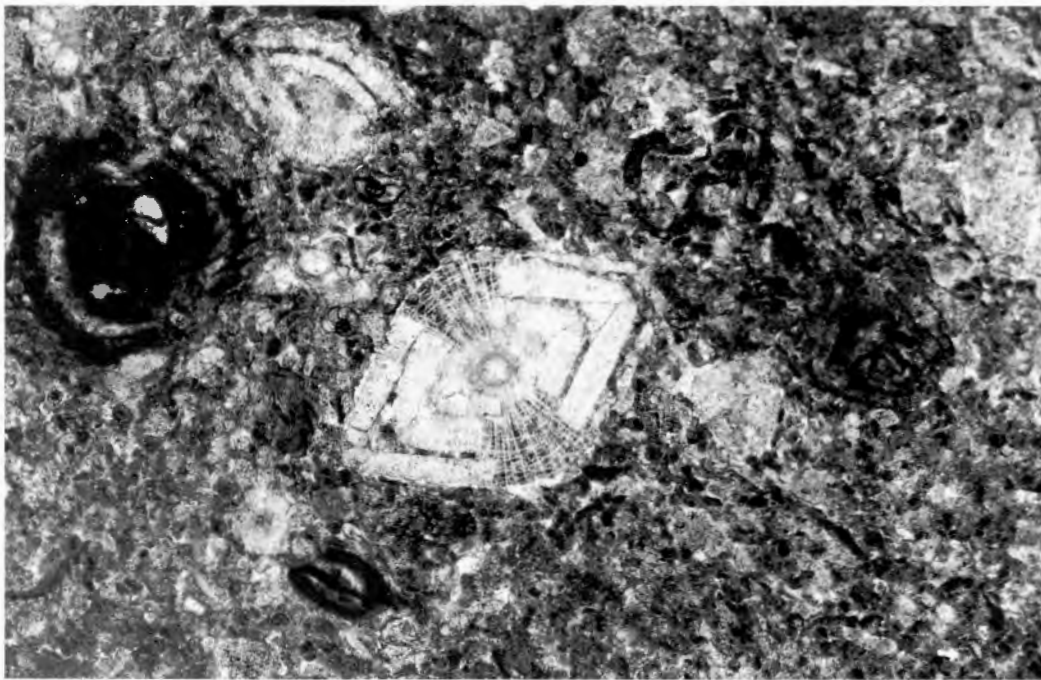
Ranikothalia (X 16).
UPPER PALEOCENE of Seh Kūteh 1 well,
Zagros, Iran.

PALEOCENE			EOCENE			OLIGOCENE			MIOCENE			PLIOCENE	PLEISTOCENE
E.	M.	L.	E.	M.	L.	E.	M.	L.	E.	M.	L.		

The first *Nummulitidae* are represented by genus
Ranikothalia.



Ranikothalia, *Miscellanea*, *Saudia*
labyrinthica GRIMSDALE, *Operculina* and
Sakesaria (X 8).
UPPER PALEOCENE of Seh Kuteh 1 well,
Zagros, Iran.



Nummulites. *Alveolina* is also present (X 30).
 LOWERMOST EOCENE of Golž, Yugoslavia.

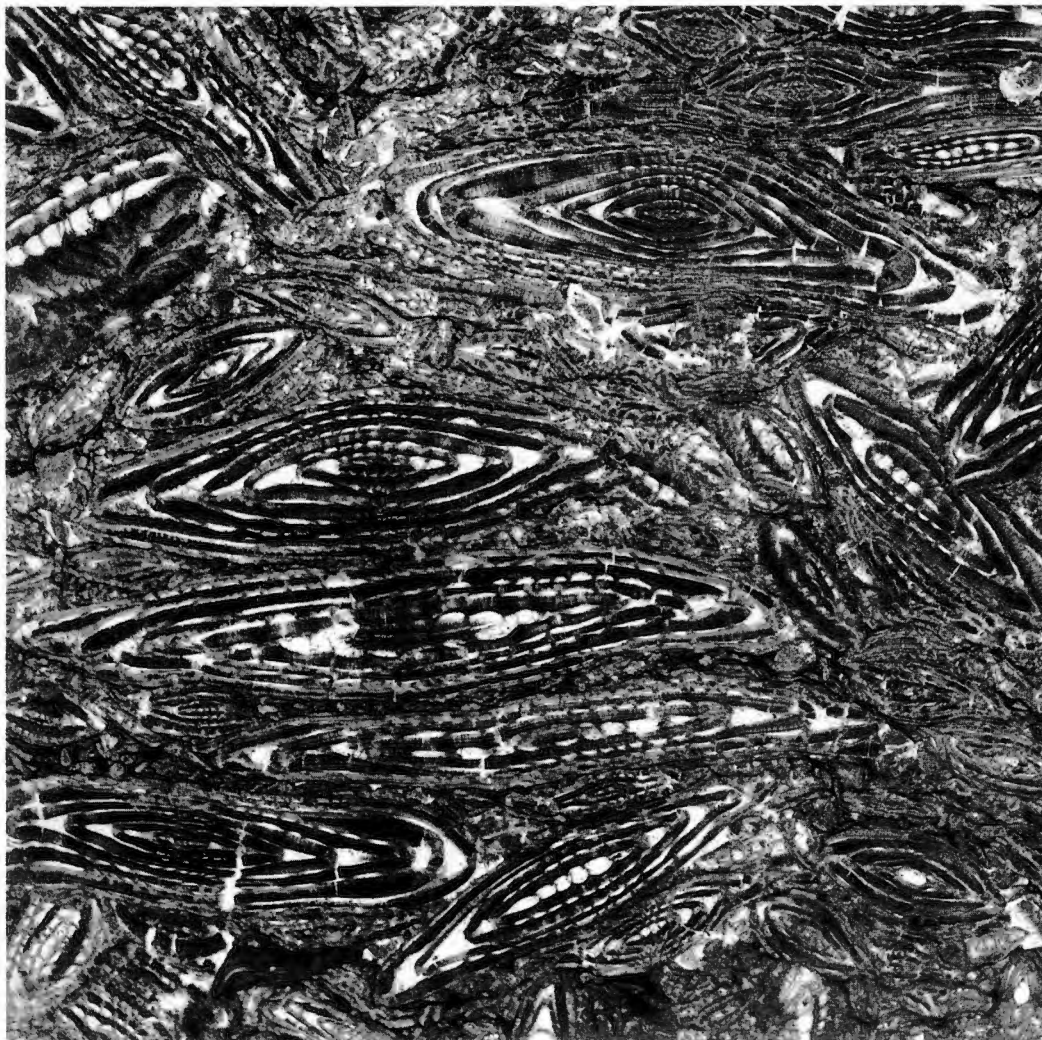
PALEOCENE			EOCENE			OLIGOCENE			MIOCENE			PLIOCENE	PLEISTOCENE
E.	M.	L.	E.	M.	L.	E.	M.	L.	E.	M.	L.		



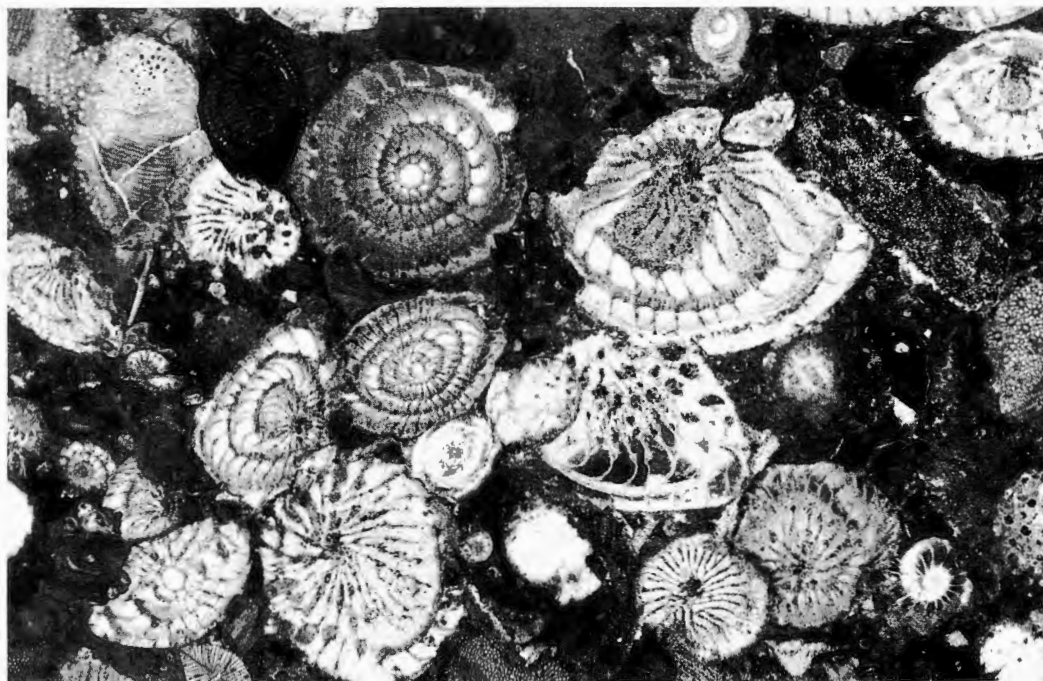
Nummulites, *Assilina*, *Discocyclina*, *Alveolina*, *Orbitolites*, *Rotaliidae* (X 15).
 LOWER EOCENE of Kuh-e-Sefid, Zagros, Iran.



Nummulites (X 20).
LOWER EOCENE of Tripolitania offshore,
Libya.

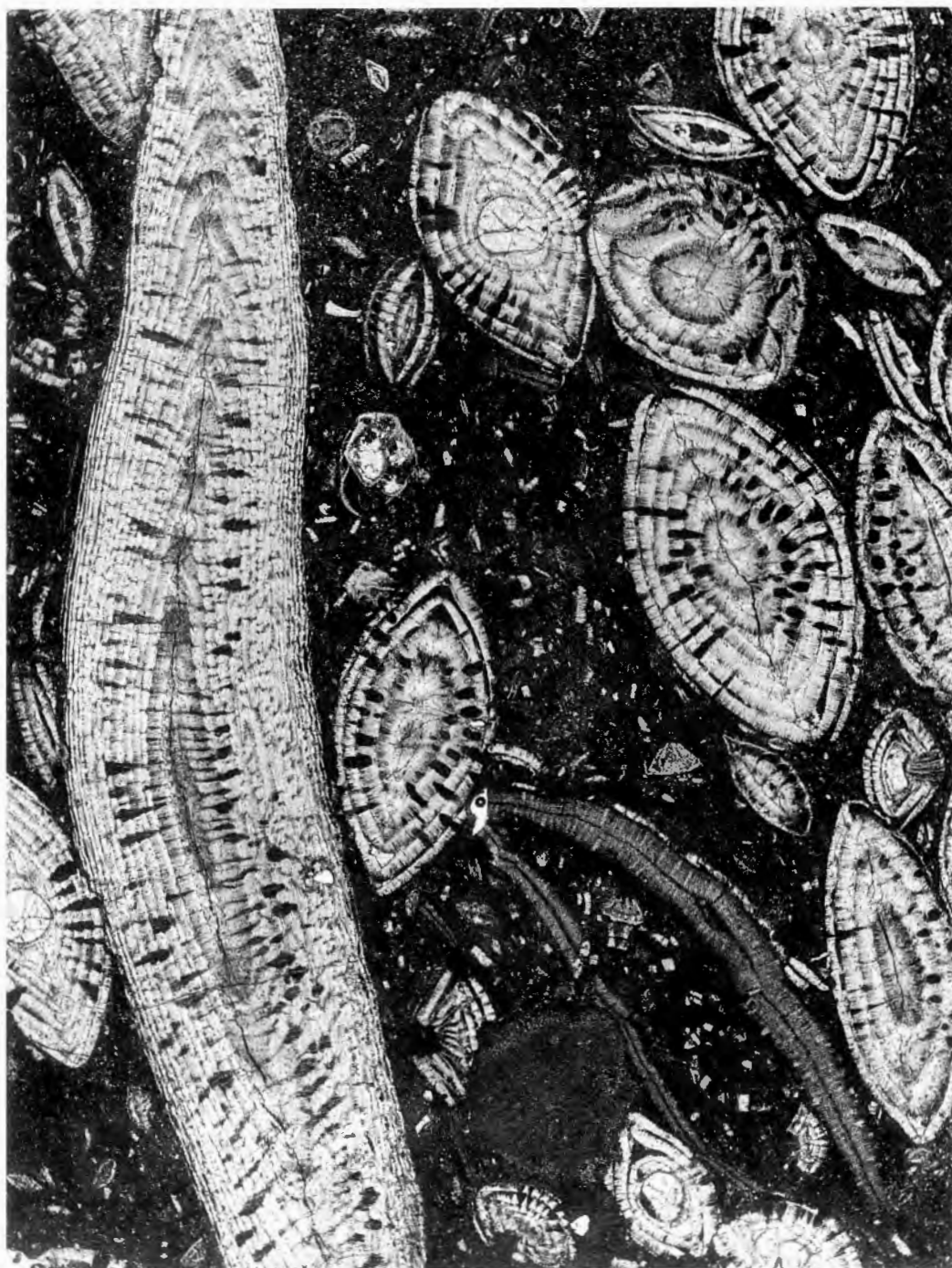


Nummulites (X 10).
LOWER EOCENE of Tripolitania offshore,
Libya.



Nummulites, *Discocyclina*, *Alveolina* and echinoids (X 10).
MIDDLE EOCENE of Monte Postale, Venetia, Italy.

COLL.: SARTORIO



Nummulites and *Discocyclina* (X 8).
MIDDLE EOCENE of Darreh Ghiarmtar, Zagros, Iran.

Well evident pillars in *Nummulites* are typical of the MIDDLE EOCENE.

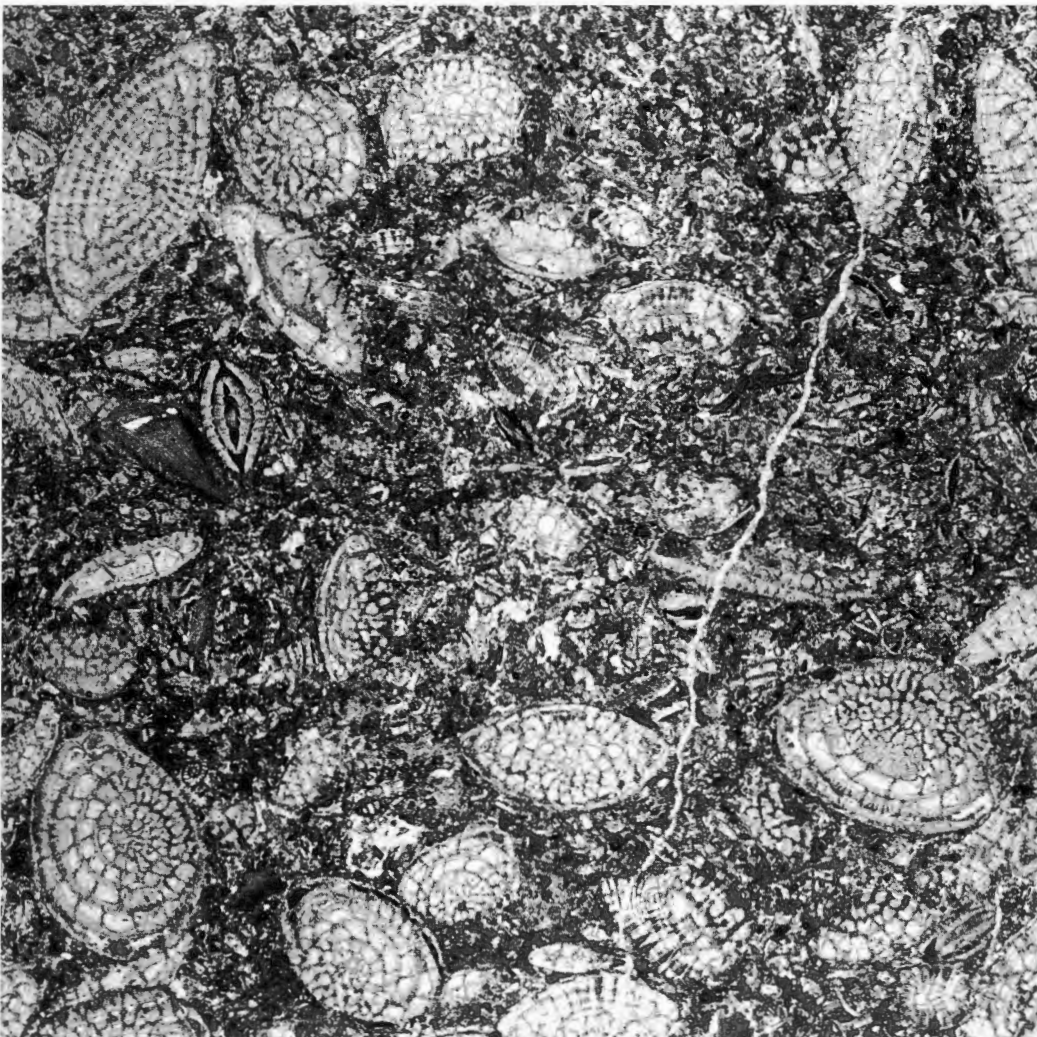
Opposite page
Nummulites, *Discocyclina*, *Actinocyclina*, *Sphaerogypsina*, *Fabiania*, *Alveolina*, *Asterigerina*, *Rotaliidae*, anellids and *Lithothamnium* (X 15).
MIDDLE EOCENE of Pachino, Sicily, Italy.

Large *Nummulites* become extinct at the end of the MIDDLE EOCENE.





Nummulites (X 7).
UPPER EOCENE of Tang-e-Karsondun,
Zagros, Iran.

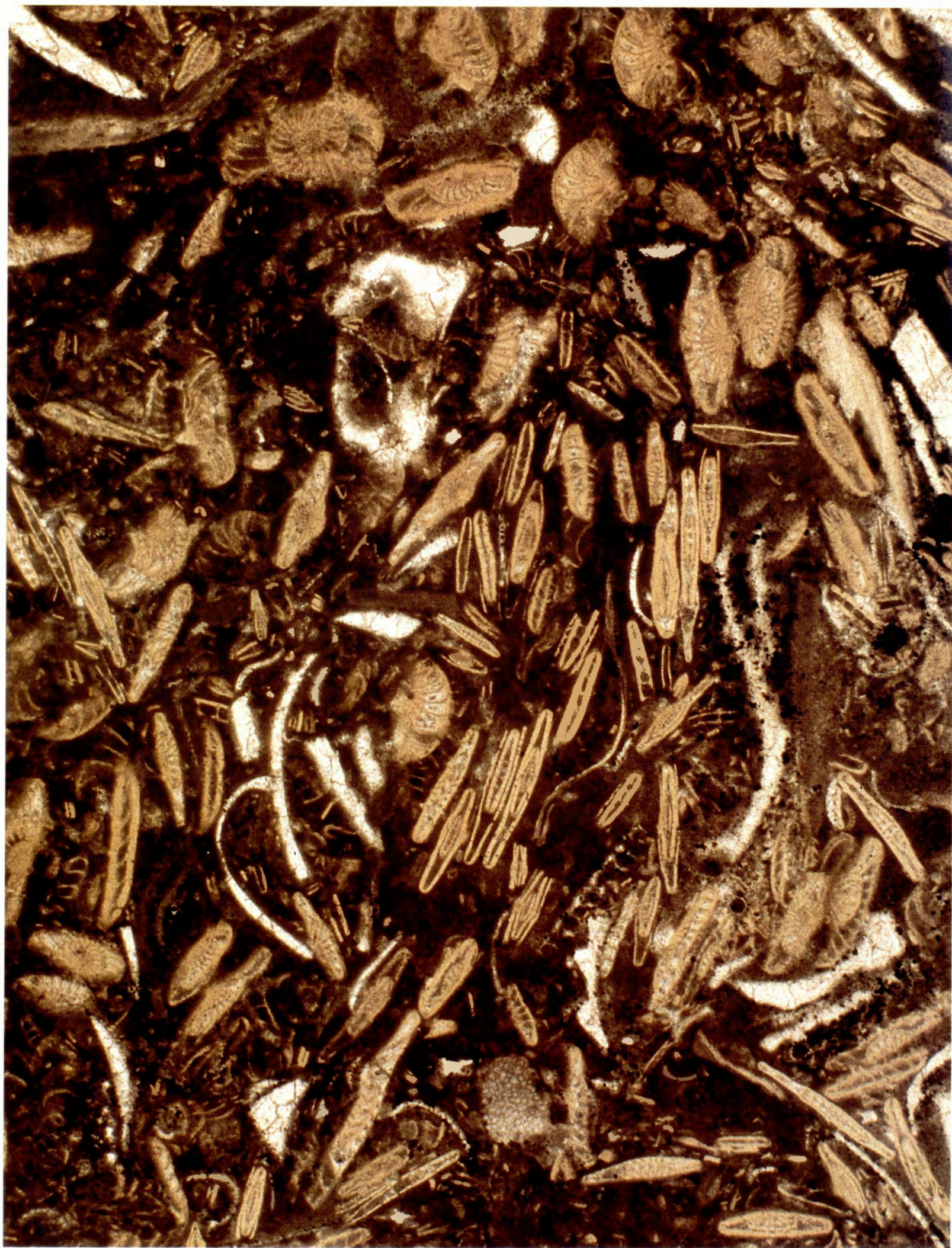


Nummulites (X 10).
OLIGOCENE of Tang-e-Khoshk, Zagros,
Iran.

Opposite page
Assilina, *Discocyclina*, *Nummulites* and
Operculina are present (X 20).
MIDDLE EOCENE of Istria, Yugoslavia.

PALEOCENE			EOCENE			OLIGOCENE			MIOCENE			PLIOCENE	PLEISTOCENE
E.	M.	L.	E.	M.	L.	E.	M.	L.	E.	M.	L.		

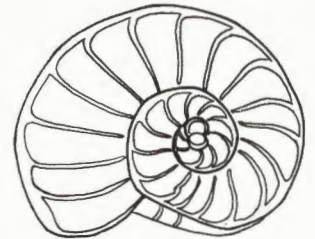






Opposite page
Operculina (X 18).
 UPPER EOCENE of B1-82 well, Sirte
 Basin.
 Detail from HOTTINGER 1964 (X 20).

PALEOCENE			EOCENE			OLIGOCENE			MIOCENE			PLIOCENE	PLEISTOCENE
E.	M.	L.	E.	M.	L.	E.	M.	L.	E.	M.	L.		

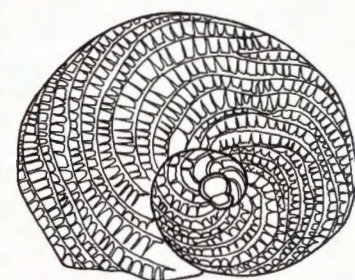


Heterostegina (X 15).
 MIDDLE MIOCENE of Monte della Grotta,
 Abruzzo, Italy.

PALEOCENE			EOCENE			OLIGOCENE			MIOCENE			PLIOCENE	PLEISTOCENE
E.	M.	L.	E.	M.	L.	E.	M.	L.	E.	M.	L.		



Heterostegina (X 8).
 MIDDLE MIOCENE of Monte della Grotta,
 Abruzzo, Italy.
 Detail from HOTTINGER 1964 (X 20).

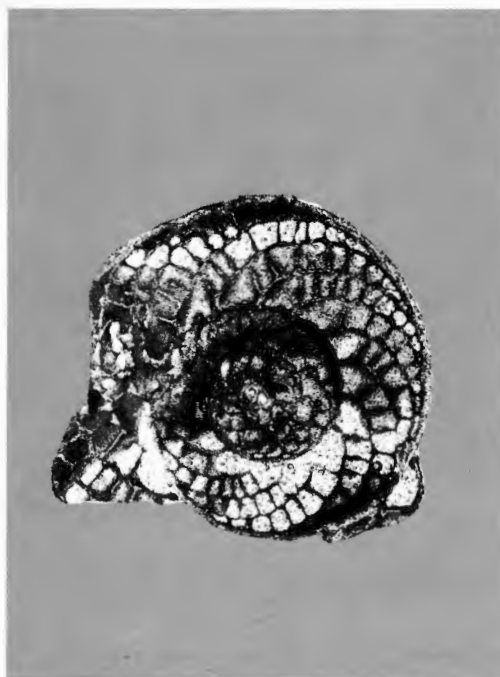




Spiroclypeus, *Amphistegina*, *Heterostegina* and *Lithothamnium* (X 10).
UPPER OLIGOCENE of Tang-e-Anjoman,
Zagros, Iran.



Spiroclypeus (X 15) (left).
UPPER EOCENE of Possagno, Venetia,
Italy.



Spiroclypeus (X 15) (right).
UPPER EOCENE of Possagno, Venetia,
Italy.

PALEOCENE			EOCENE			OLIGOCENE			MIOCENE			PLIOCENE	PLEISTOCENE
E.	M.	L.	E.	M.	L.	E.	M.	L.	E.	M.	L.		

This genus differs from *Heterostegina* in having lateral chambers developed on each side of the median layer.



Pellatospira, *Spiroclypeus*, *Amphistegina*, *Discocyclusina*, *Gypsina*, *Lithothamnium* and *Lithophyllum* (X 15).
UPPER EOCENE of Verona, Venetia, Italy.



Pellatospira (X 20) (left).
UPPER EOCENE of Termini Imerese,
Sicily, Italy.

Pellatospira (X 25) (right).
UPPER EOCENE of Termini Imerese,
Sicily, Italy.

PALEOCENE			EOCENE			OLIGOCENE			MIOCENE			PLIOCENE	PLEISTOCENE
E.	M.	L.	E.	M.	L.	E.	M.	L.	E.	M.	L.		



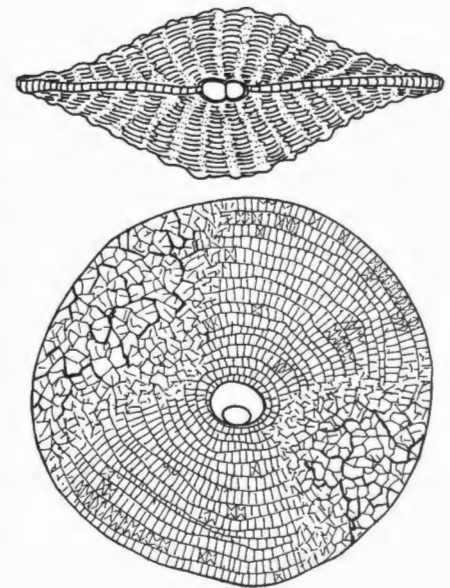


Opposite page
Discocyclinidae (*Discocyclina*,
Asterocyclina), *Nummulites*, *Assilina*,
 planktonic foraminifers, echinoids,
Lithophyllum and *Lithothamnium* (X 20).
 LOWER EOCENE of Monte Spilecco,
 Venetia, Italy.

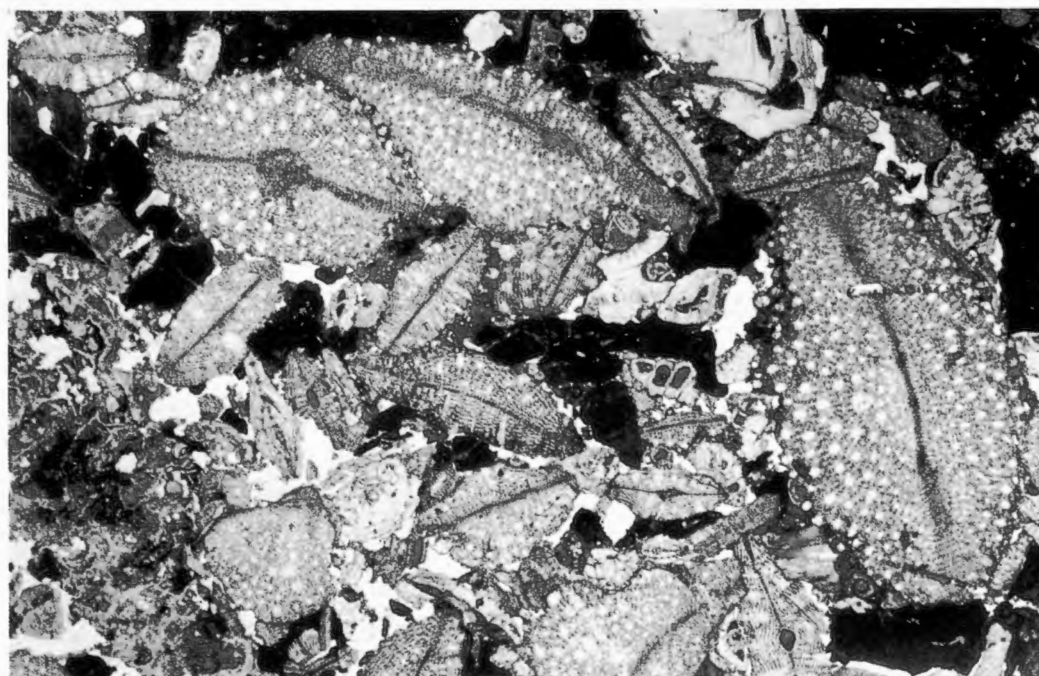
PALEOCENE			EOCENE			OLIGOCENE			MIOCENE			PLIOCENE	PLEISTOCENE
E.	M.	L.	E.	M.	L.	E.	M.	L.	E.	M.	L.		
■													

The PALEOCENE and the EOCENE are
 characterized by *Discocyclinidae* which take the
 place of CRETACEOUS *Orbitoididae*.

Discocyclina, *Nummulites*, *Amphistegina*,
Eorupertia, *Lithothamnium* (X 10).
 MIDDLE EOCENE of Monte Ongarina,
 Venetia, Italy.



General features of the *Discocyclinidae* : vertical
 section (X 20) (above) and equatorial section showing
 rectangular equatorial chambers (X 20) (below).

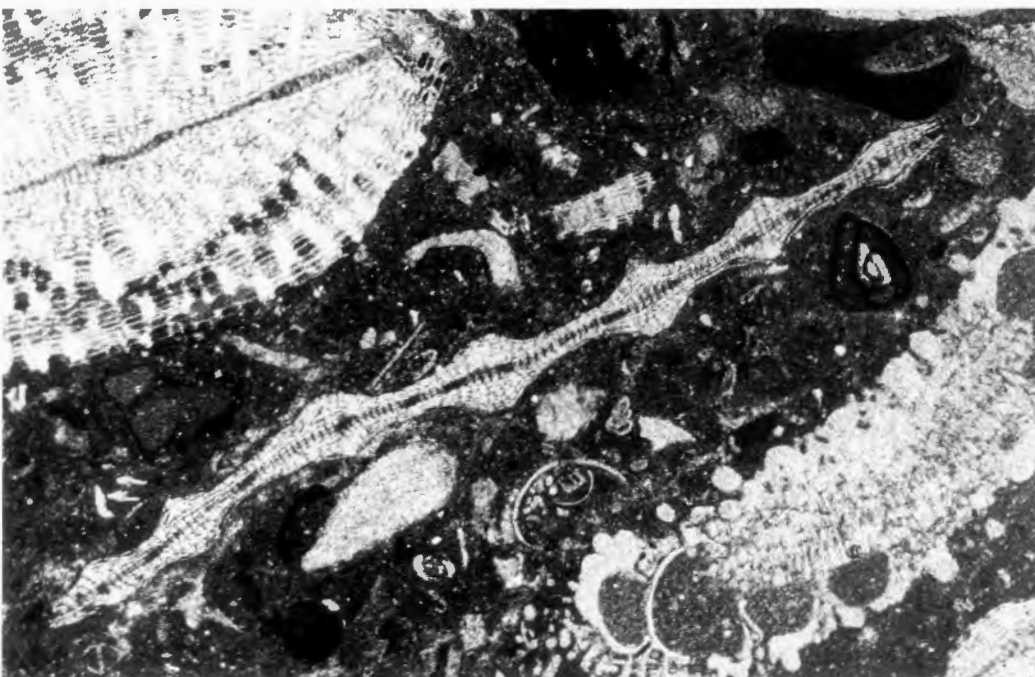
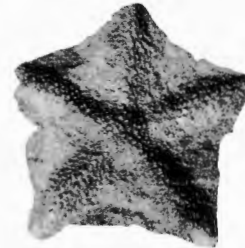


Discocyclina, *Nummulites*, *Rotaliidae*
 (X 15).
 UPPER EOCENE of Gassino, Piedmont,
 Italy.



Asterocyclina, *Discocyclina*, *Nummulites*, *Amphistegina* and planktonic foraminifers are present (X 20).
UPPER EOCENE of Monte Potino, Umbria, Italy.
Detail from NEUMANN 1958 (X 5).

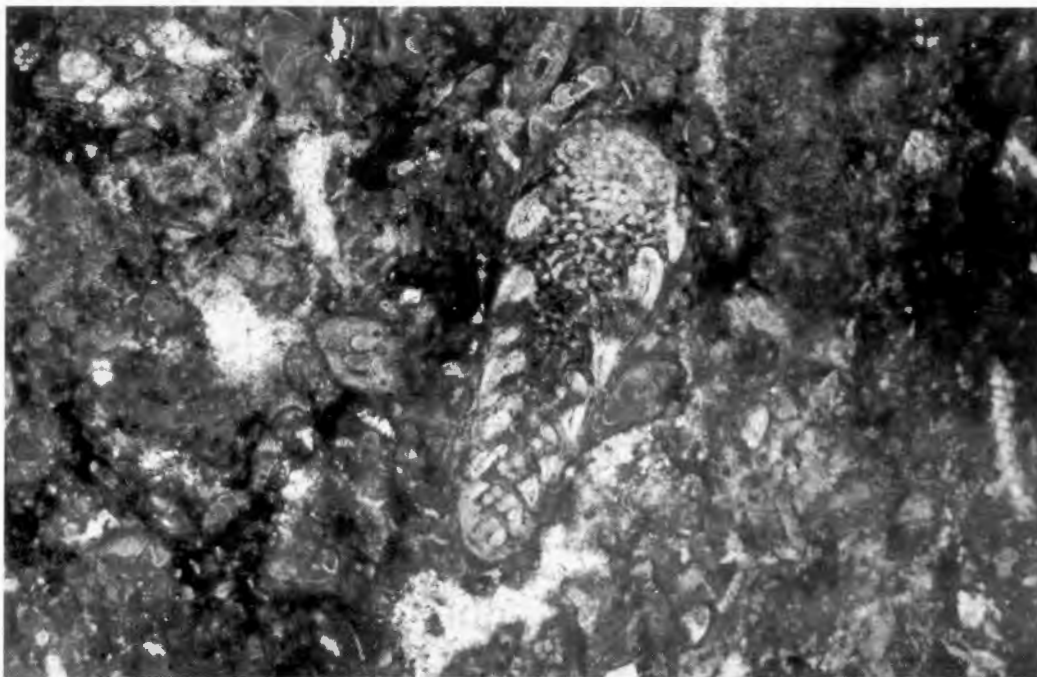
PALEOCENE			EOCENE			OLIGOCENE			MIOCENE			PLIOCENE	PLEISTOCENE
E.	M.	L.	E.	M.	L.	E.	M.	L.	E.	M.	L.		



Actinocyclina, *Discocyclina*, *Pellatispira*, *Miliolidae* and *Melobesiae* are present (X 25).
UPPER EOCENE of Verona, Venetia, Italy.
Detail from NEUMANN 1958 (X 3).

PALEOCENE			EOCENE			OLIGOCENE			MIOCENE			PLIOCENE	PLEISTOCENE
E.	M.	L.	E.	M.	L.	E.	M.	L.	E.	M.	L.		





Sakesaria (X 20).
LOWER EOCENE of Jabal Halmut, P.D.R. of Yemen.

PALEOCENE			EOCENE			OLIGOCENE			MIOCENE			PLIOCENE	PLEISTOCENE
E.	M.	L.	E.	M.	L.	E.	M.	L.	E.	M.	L.		

This form and the following ones are common from North Africa to the Middle East.



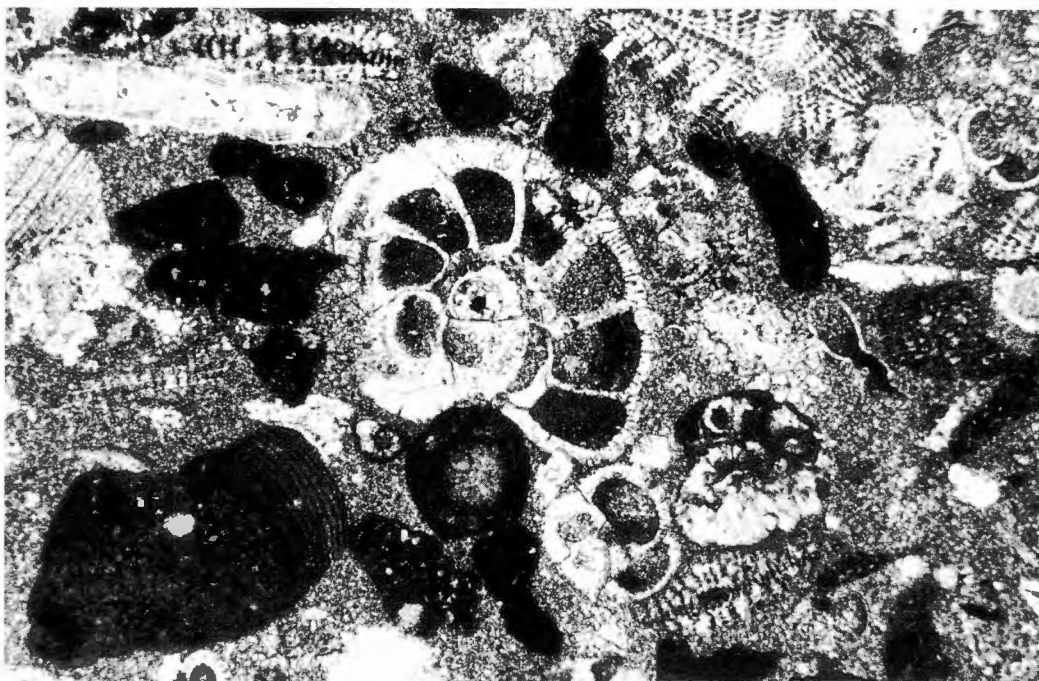
Lockhartia. *Nummulites* are present (X 20).
MIDDLE EOCENE of Ras Ghashwah 2X bis well, P.D.R. of Yemen.

PALEOCENE			EOCENE			OLIGOCENE			MIOCENE			PLIOCENE	PLEISTOCENE
E.	M.	L.	E.	M.	L.	E.	M.	L.	E.	M.	L.		



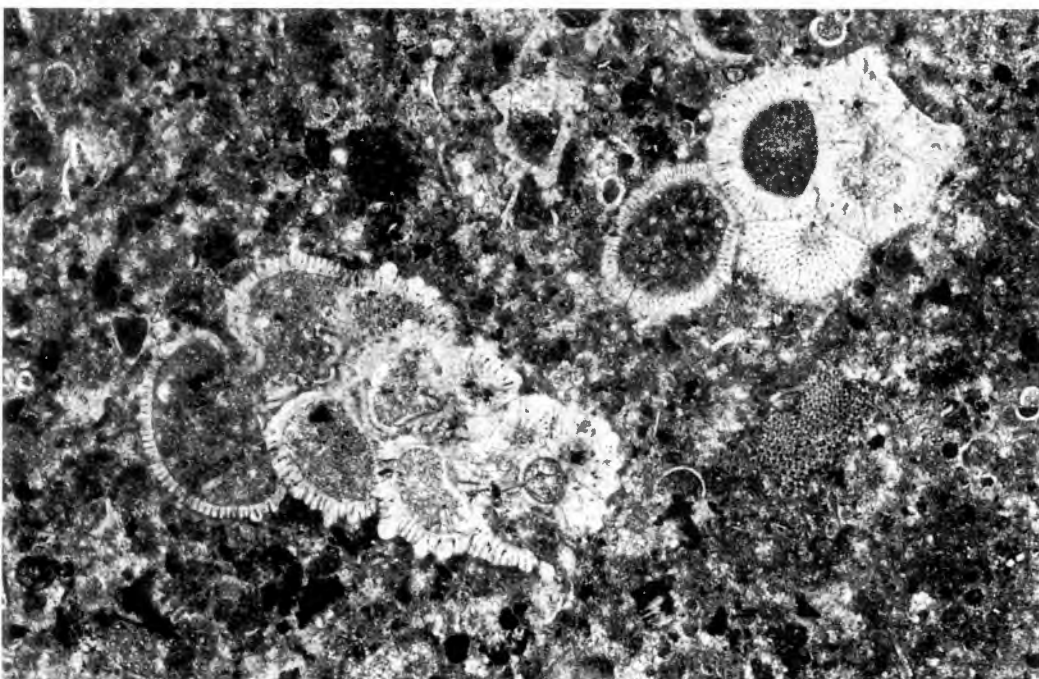
Linderina (X 35).
MIDDLE EOCENE of Northern Somaliland.

PALEOCENE			EOCENE			OLIGOCENE			MIOCENE			PLIOCENE	PLEISTOCENE
E.	M.	L.	E.	M.	L.	E.	M.	L.	E.	M.	L.		



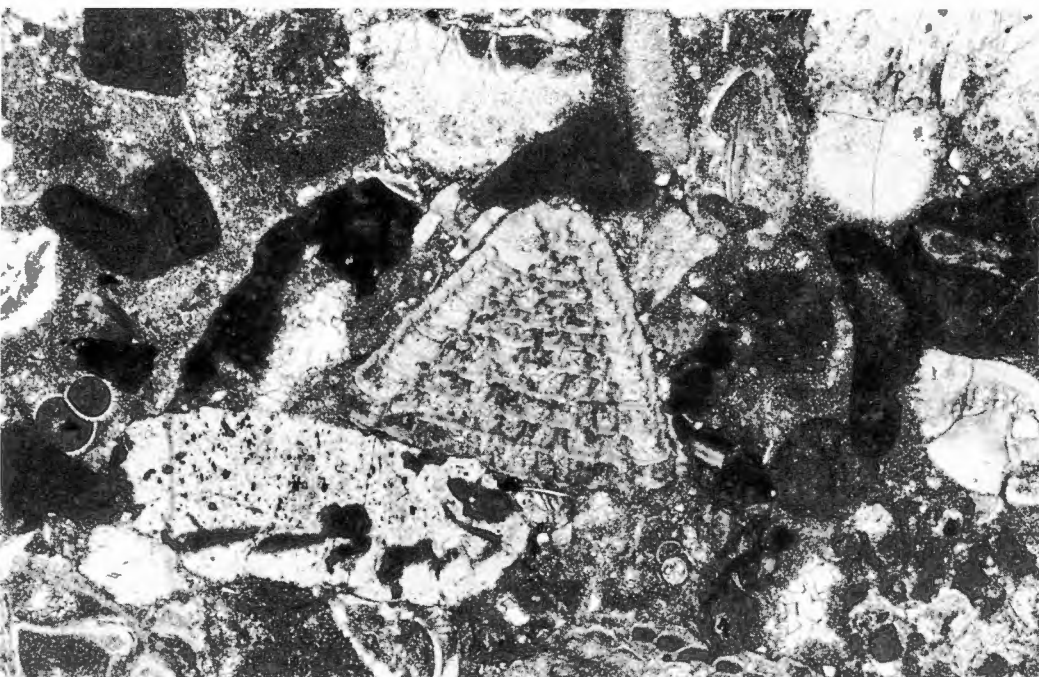
Eorupertia, *Discocyclina* and *Melobesiae* are also present (X 40).
UPPER EOCENE of Monte Varchi,
Tuscany, Italy.

PALEOCENE			EOCENE			OLIGOCENE			MIOCENE			PLIOCENE	PLEISTOCENE
E.	M.	L.	E.	M.	L.	E.	M.	L.	E.	M.	L.		



Victoriella (X 30).
LOWER OLIGOCENE of Chahardeh,
Zagros, Iran.

PALEOCENE			EOCENE			OLIGOCENE			MIOCENE			PLIOCENE	PLEISTOCENE
E.	M.	L.	E.	M.	L.	E.	M.	L.	E.	M.	L.		

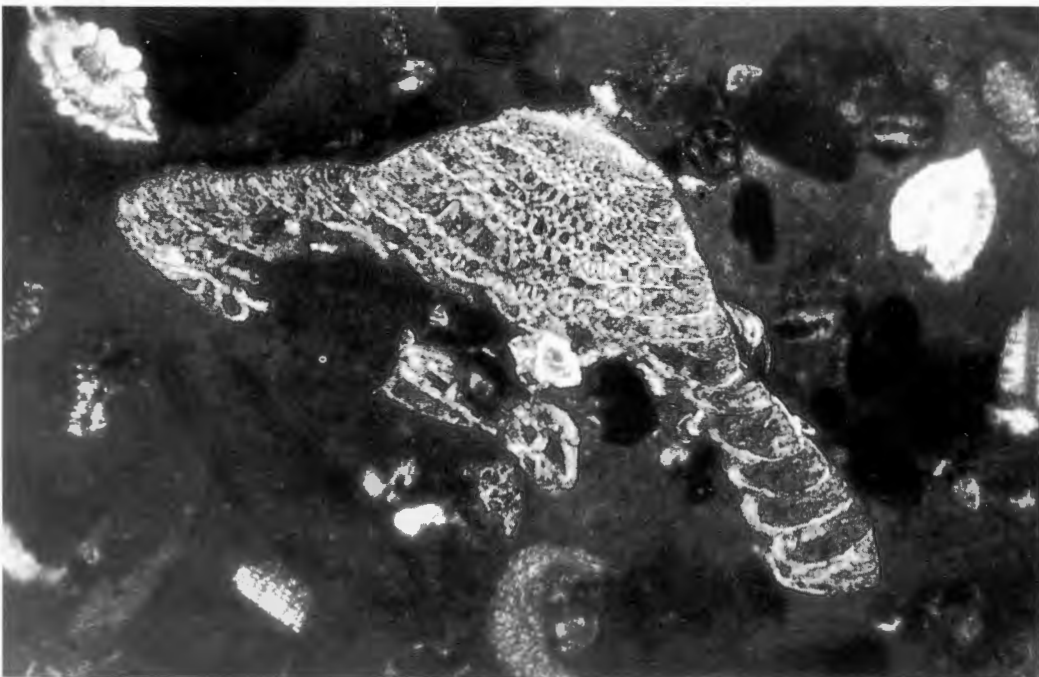


Chapmanina, *Rotaliidae*, planktonic
foraminifera and *Melobesiae* are present
(X 45).
UPPER EOCENE, from a pebble reworked
in the MIOCENE of Arezzo, Tuscany, Italy.

PALEOCENE			EOCENE			OLIGOCENE			MIOCENE			PLIOCENE	PLEISTOCENE
E.	M.	L.	E.	M.	L.	E.	M.	L.	E.	M.	L.		



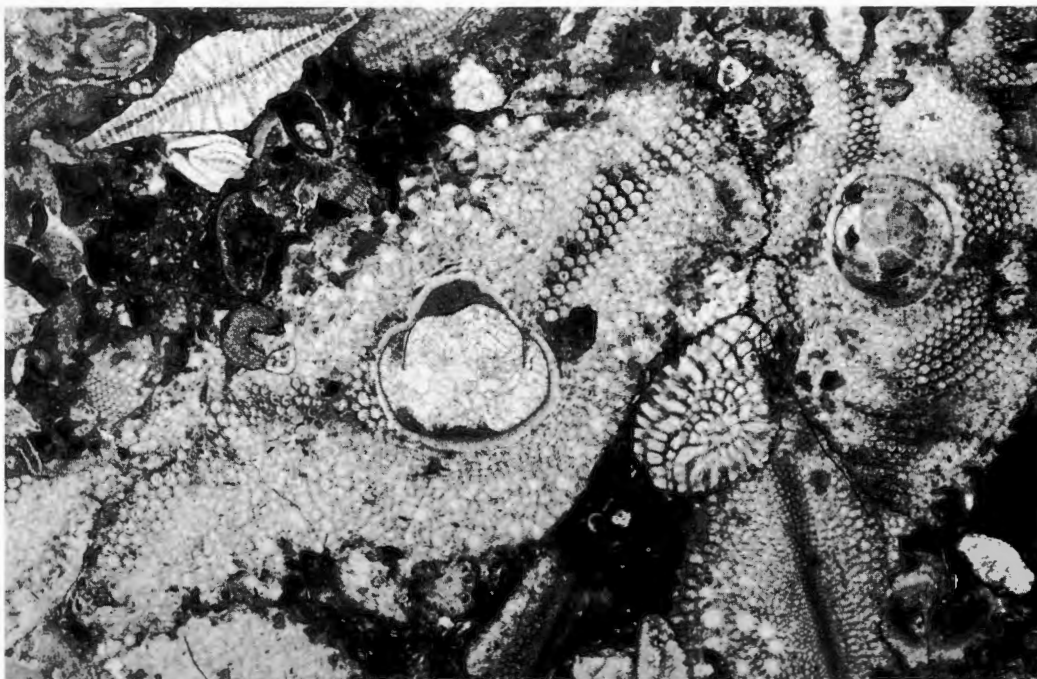
Chapmanina, *Victoriella*, *Gypsina*,
Nummulites, *Rotaliidae*, bryozoans
echinoids and *Melobesia* (X 20).
UPPER EOCENE of Fara Sabina, Latium,
Italy.



Fabiania (X 30). Detail (X 25).
MIDDLE EOCENE of Pachino, Sicily, Italy.

PALEOCENE			EOCENE			OLIGOCENE			MIOCENE			PLIOCENE	PLEISTOCENE
E.	M.	L.	E.	M.	L.	E.	M.	L.	E.	M.	L.		





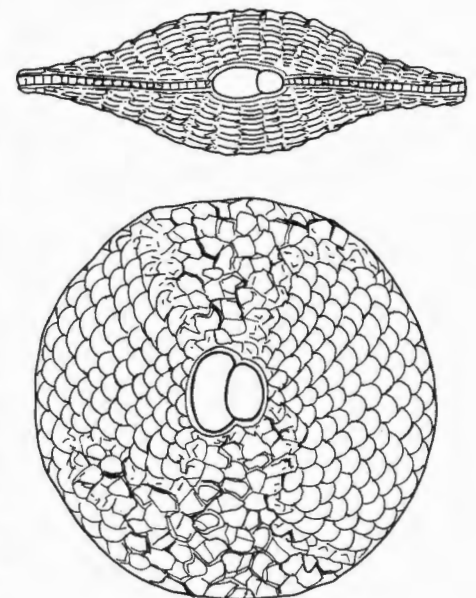
Lepidocyclina (*Eulepidina* and *Nephrolepidina*). *Heterostegina*, and *Amphistegina*, are present (X 25). UPPER OLIGOCENE of Monte S. Giovanni, Latium, Italy.

PALEOCENE			EOCENE			OLIGOCENE			MIOCENE			PLIOCENE	PLEISTOCENE
E.	M.	L.	E.	M.	L.	E.	M.	L.	E.	M.	L.		

In the OLIGOCENE-EARLY MIOCENE the *Lepidocyclinidae* take the place of the *Discocyclinidae*. This family, already present in America in the EOCENE migrated towards the east during the OLIGOCENE.



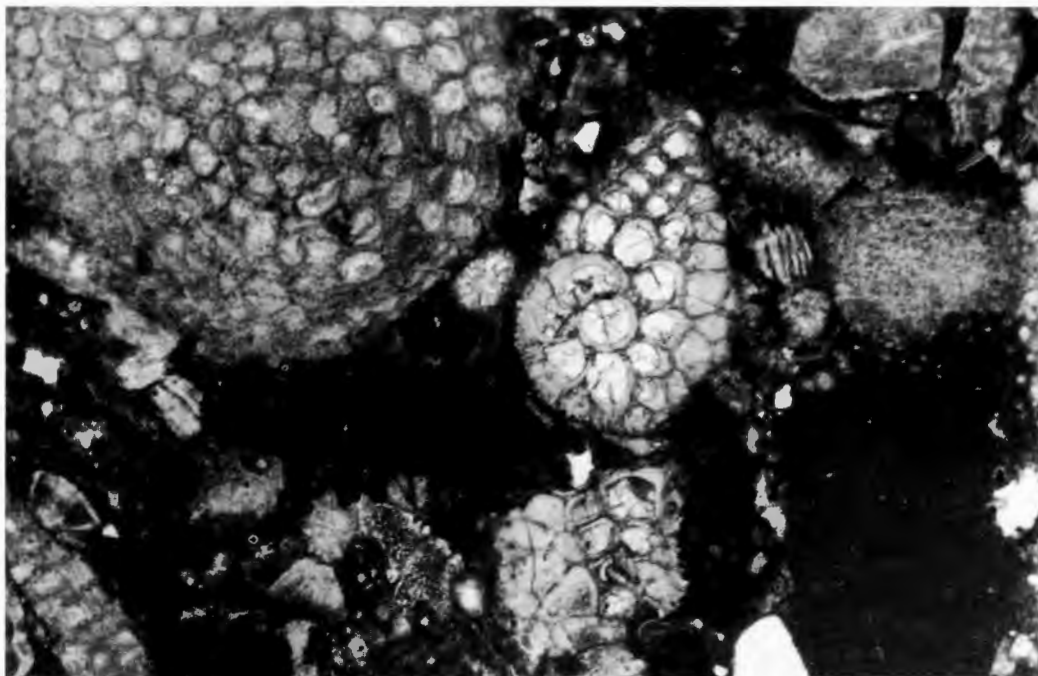
Lepidocyclina (*Nephrolepidina* and *Eulepidina*), *Miogypsinoidea*, *Amphistegina* and planktonic foraminifera (X 15). UPPER OLIGOCENE of Arezzo, Tuscany, Italy.



General features of *Lepidocyclina*: vertical section (X 10) (above) and equatorial section showing arcuate equatorial chambers (X 10) (below).

Opposite page
Lepidocyclina (*Eulepidina*), *Amphistegina*, *Operculina*. (X 18).
UPPER OLIGOCENE of Lettomanoppello, Abruzzo, Italy.



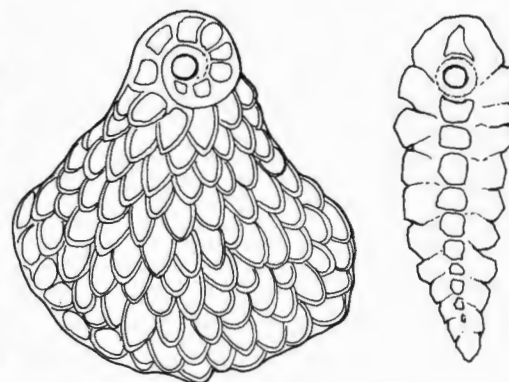


Miogypsinooides (X 30).
LATE OLIGOCENE of Sestola, Emilia,
Italy.

PALEOCENE			EOCENE			OLIGOCENE			MIOCENE			PLIOCENE	PLEISTOCENE
E	M	L	E	M	L	E	M	L	E	M	L		



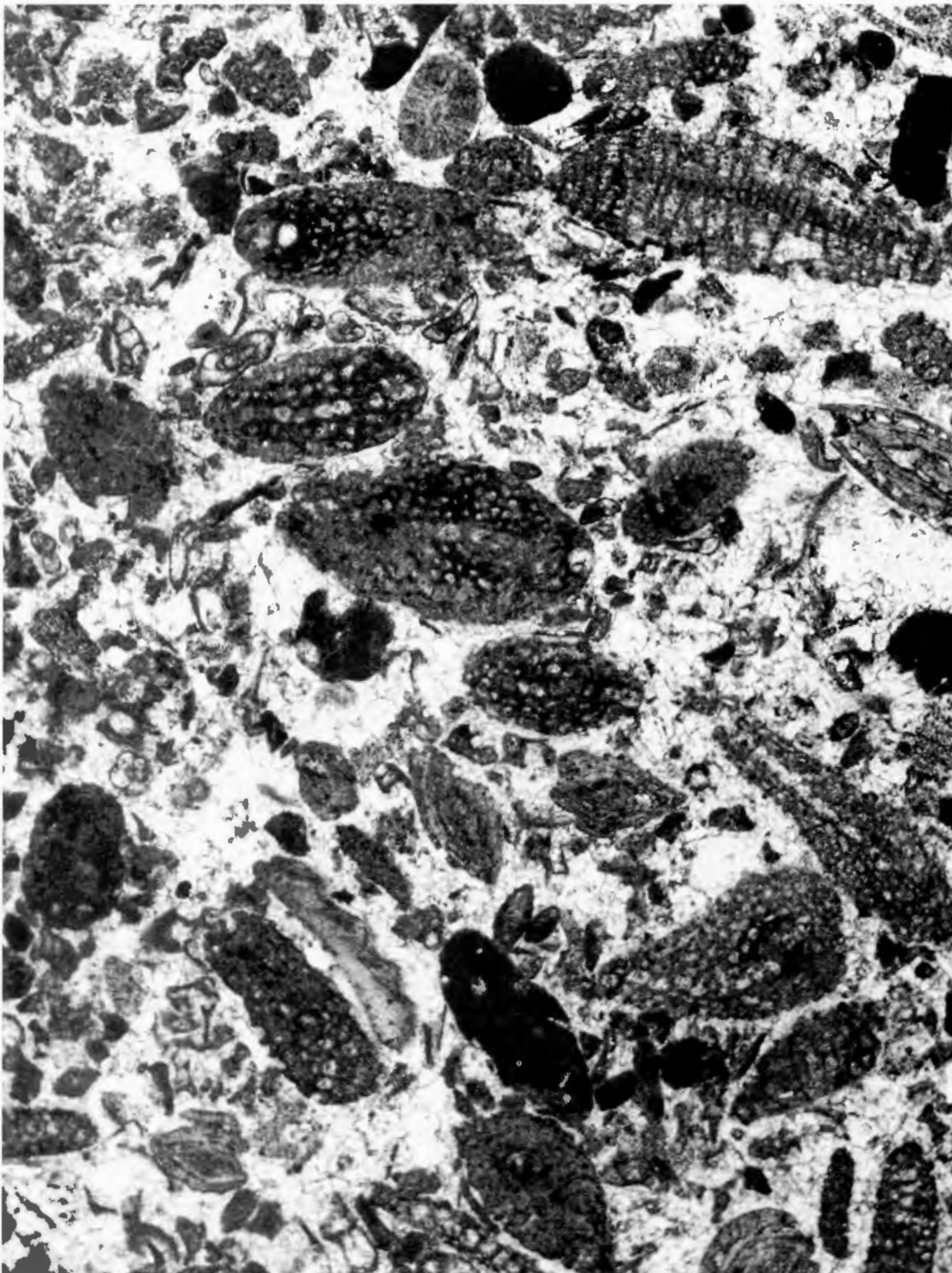
Miogypsinooides, *Lepidocyclina*
(*Nephrolepidina*), *Amphistegina*,
Operculina and *Eulepidina* fragments
(X 20).
UPPER OLIGOCENE of Città di Castello,
Umbria, Italy.



General features of *Miogypsina*: equatorial section
(X 20) (above) and vertical section (X 20) (below).

Opposite page
Miogypsinooides, *Lepidocyclina*
(*Nephrolepidina* and *Eulepidina*),
Spiroclypeus, *Amphistegina*,
Sphaerogypsina and bryozoans (X 10).
UPPER OLIGOCENE of Monte Buono,
Umbria, Italy.

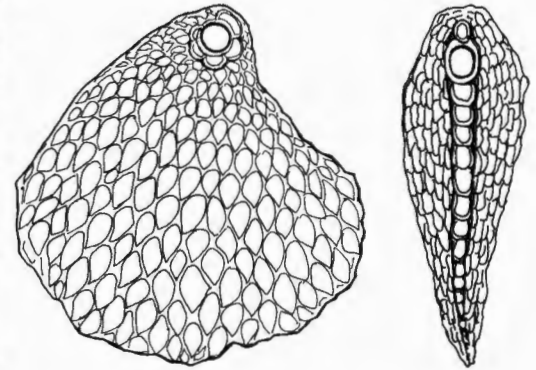




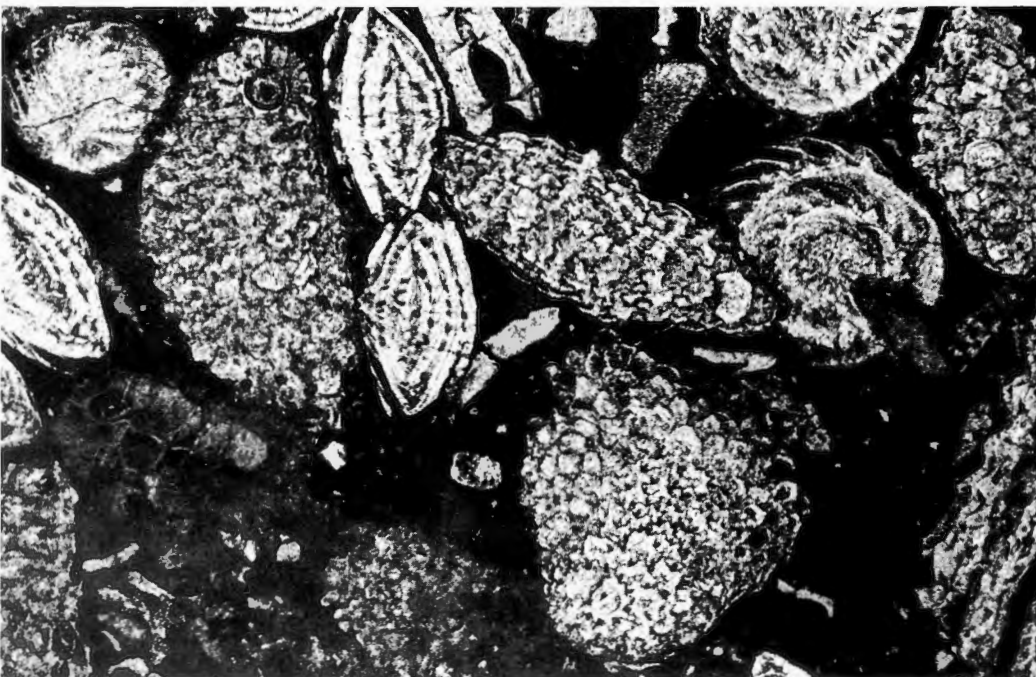
Miogypsina. *Amphistegina* is also present (X 20).
LOWER MIOCENE of Sampieri, Sicily, Italy.

PALEOCENE			EOCENE			OLIGOCENE			MIOCENE			PLIOCENE	PLEISTOCENE
E.	M.	L.	E.	M.	L.	E.	M.	L.	E.	M.	L.		

Miogypsina differs from *Miogypsinoides* in having lateral chambers.



General features of *Miogypsinoides*: equatorial section (X 20) (below) and vertical section (X 20) (above).



Miogypsina and *Amphistegina* (X 25).
LOWER MIOCENE of Vietri, Basilicata, Italy.



Amphistegina. Miogypsina is present (X 20).
 LOWER MIOCENE of Frosolone, Molise, Italy.

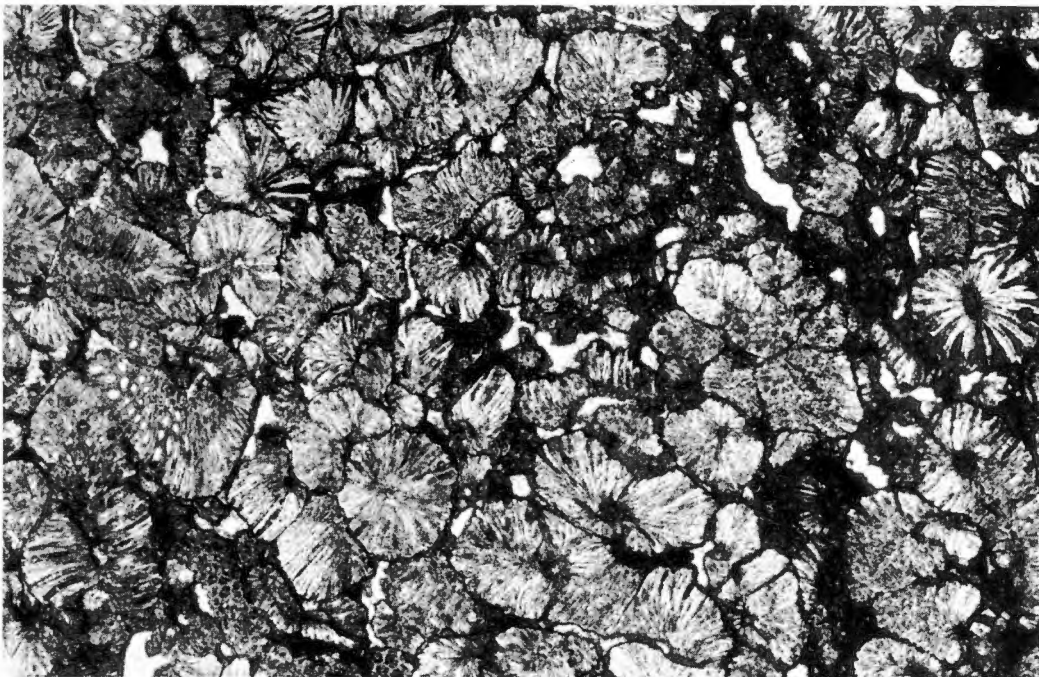
PALEOCENE			EOCENE			OLIGOCENE			MIOCENE			PLIOCENE	PLEISTOCENE
E.	M.	L.	E.	M.	L.	E.	M.	L.	E.	M.	L.		

Amphistegina a genus common to the OLIGOCENE-MIOCENE facies, should not be confused with *Nummulites*.



Elphidium (X 50).
 MIDDLE MIOCENE of Monte della Grotta, Abruzzo, Italy.

PALEOCENE			EOCENE			OLIGOCENE			MIOCENE			PLIOCENE	PLEISTOCENE
E.	M.	L.	E.	M.	L.	E.	M.	L.	E.	M.	L.		



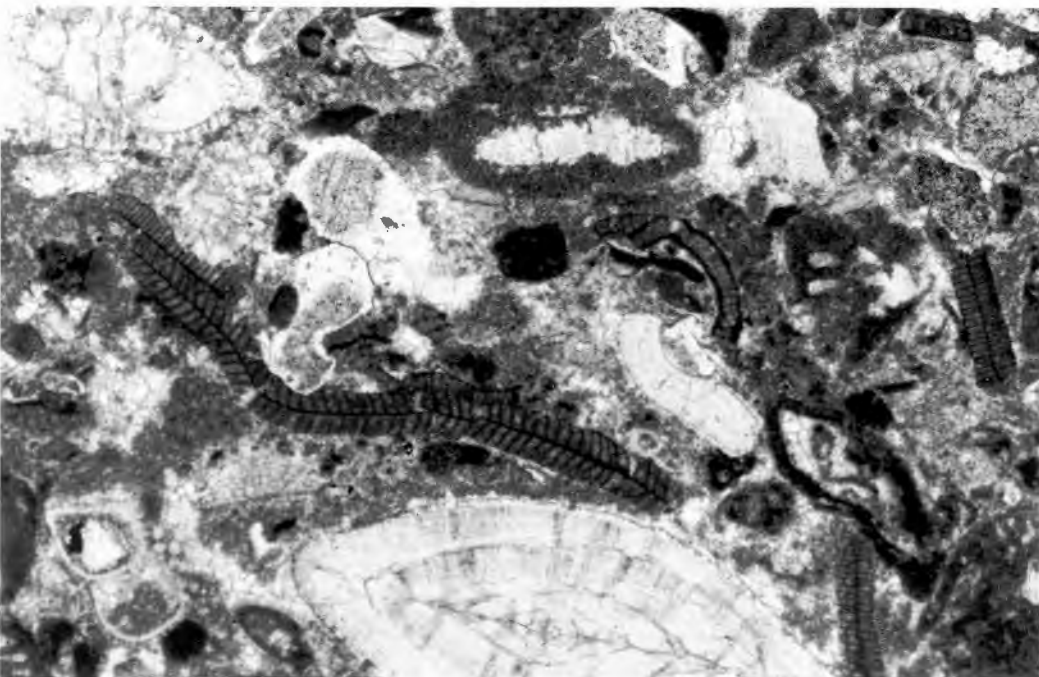
Microcodium (X 40).
PALEOCENE of Colle di Medea, Friuli,
Italy.

This structure is considered a product of calcification of plant cells whose forms have been maintained by fungi. *Microcodium* which is related to the presence of paleosols, is common from the LATE CRETACEOUS to RECENT.



Broeckella belgica MORELLET (X 12).
LOWER-MIDDLE PALEOCENE of Monte
tra le Serre, Abruzzo, Italy.

PALEOCENE			EOCENE			OLIGOCENE			MIOCENE			PLIOCENE	PLEISTOCENE
E.	M.	L.	E.	M.	L.	E.	M.	L.	E.	M.	L.		
■													

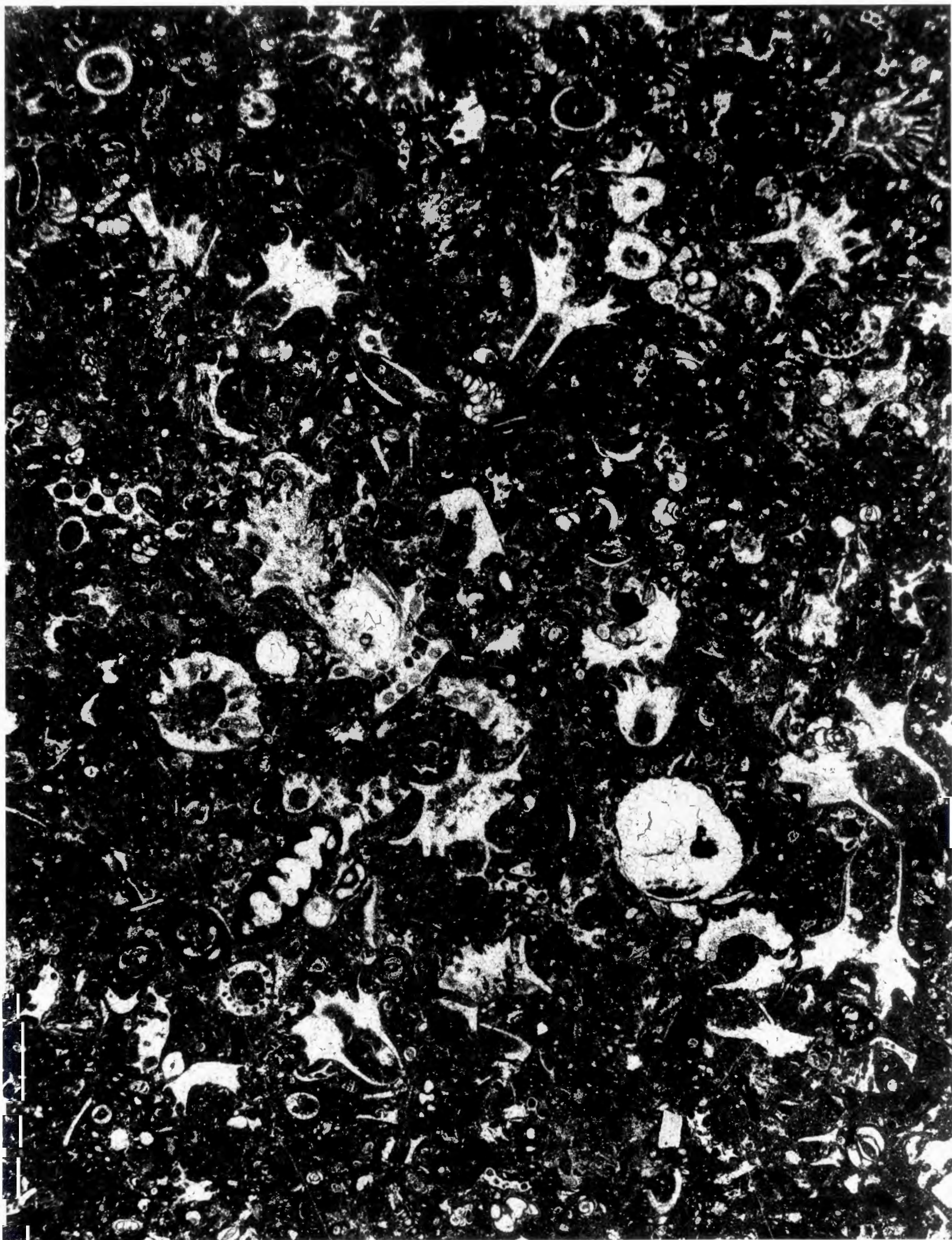


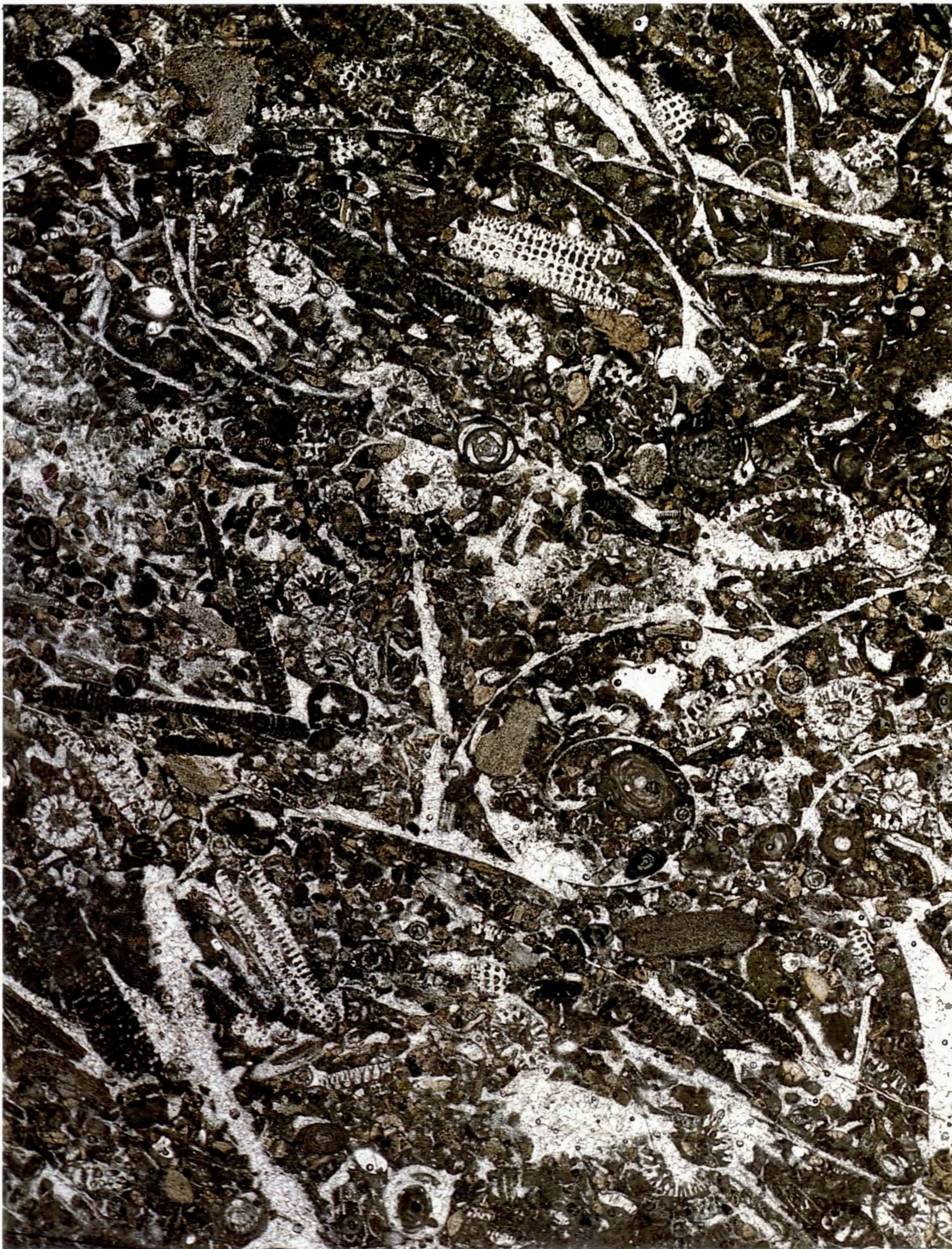
Distichoplax. Nummulites is also present
(X 50).
LOWER EOCENE of Monte Baldo,
Trentino, Italy.

PALEOCENE			EOCENE			OLIGOCENE			MIOCENE			PLIOCENE	PLEISTOCENE
E.	M.	L.	E.	M.	L.	E.	M.	L.	E.	M.	L.		
■ ■													

Opposite page
Praturlonella salernitana BARATTOLO.
Spirolina, Miliolidae, Ophthalmidiidae,
Valvulinidae are present (X 15).
UPPER PALEOCENE-EOCENE of Monte
Vesole, Campania, Italy.

PALEOCENE			EOCENE			OLIGOCENE			MIOCENE			PLIOCENE	PLEISTOCENE
E.	M.	L.	E.	M.	L.	E.	M.	L.	E.	M.	L.		
■													







COLL.: EARTH SCIENCES DEP. UNIV. OF MILAN

Opposite page
Belzungia, *Miliolidae*, *Alveolina*, *Rotaliidae*
 and *Orbitolites* are present
 (X 20).
 LOWER EOCENE of E1/NC-41 well,
 Tripolitania offshore, Libya.

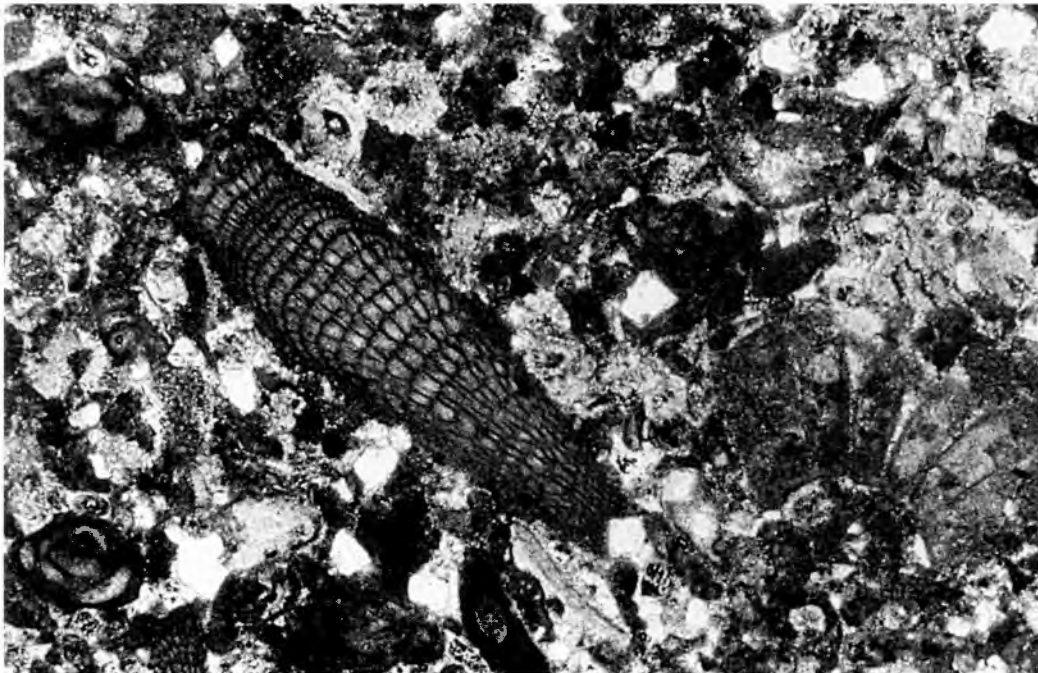
PALEOCENE			EOCENE			OLIGOCENE			MIOCENE			PLIOCENE	PLEISTOCENE
E.	M.	L.	E.	M.	L.	E.	M.	L.	E.	M.	L.		

Lithophyllum and *Lithothamnium* (X 25).
 UPPER EOCENE of Monte Baldo,
 Trentino, Italy.

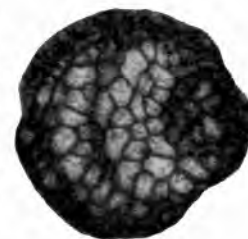
Corallinaceae (*Melobesia* and *Corallinae*) become
 particularly common during the CENOZOIC.

Subterraneanphyllum thomasi ELLIOTT (X 50).
 Detail (X 50)
 OLIGOCENE of Iran.

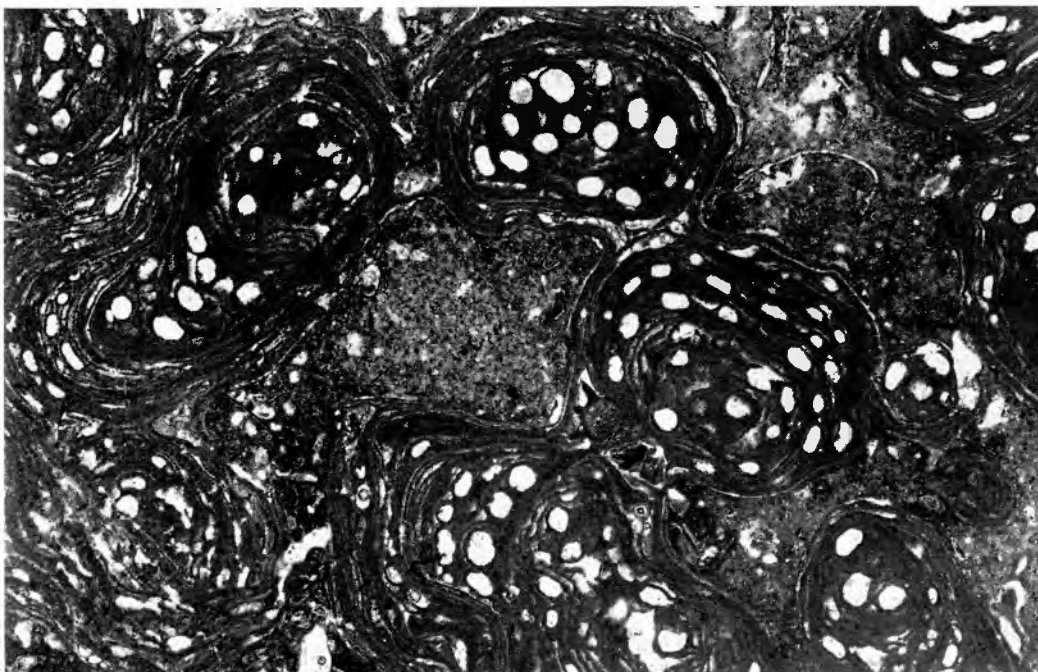
PALEOCENE			EOCENE			OLIGOCENE			MIOCENE			PLIOCENE	PLEISTOCENE
E.	M.	L.	E.	M.	L.	E.	M.	L.	E.	M.	L.		

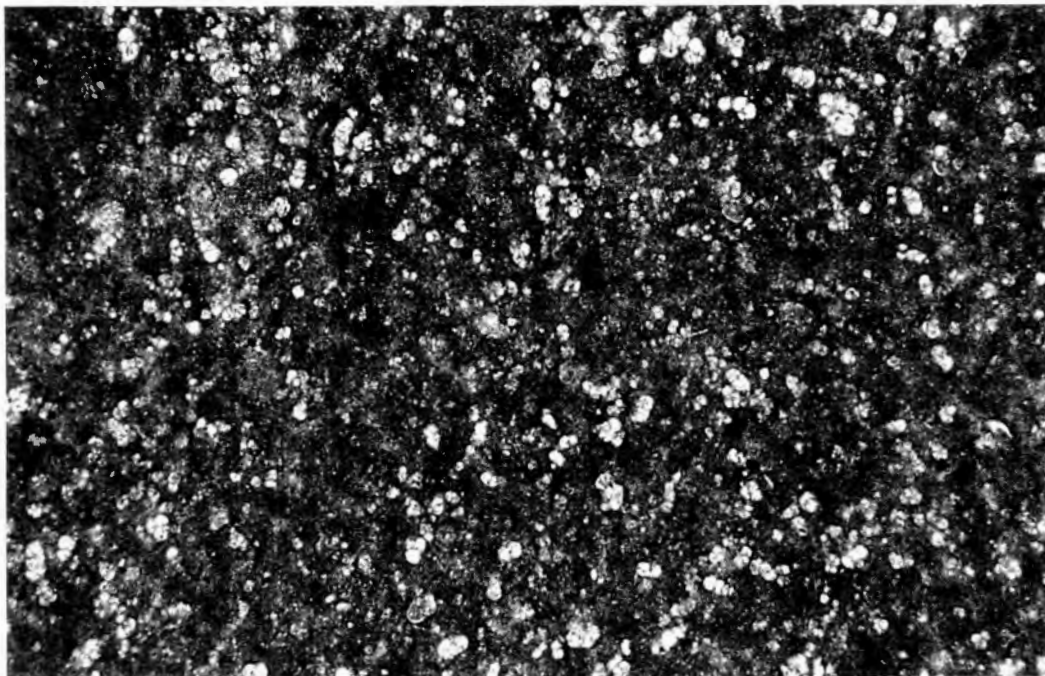


COLL.: BALDUZZI



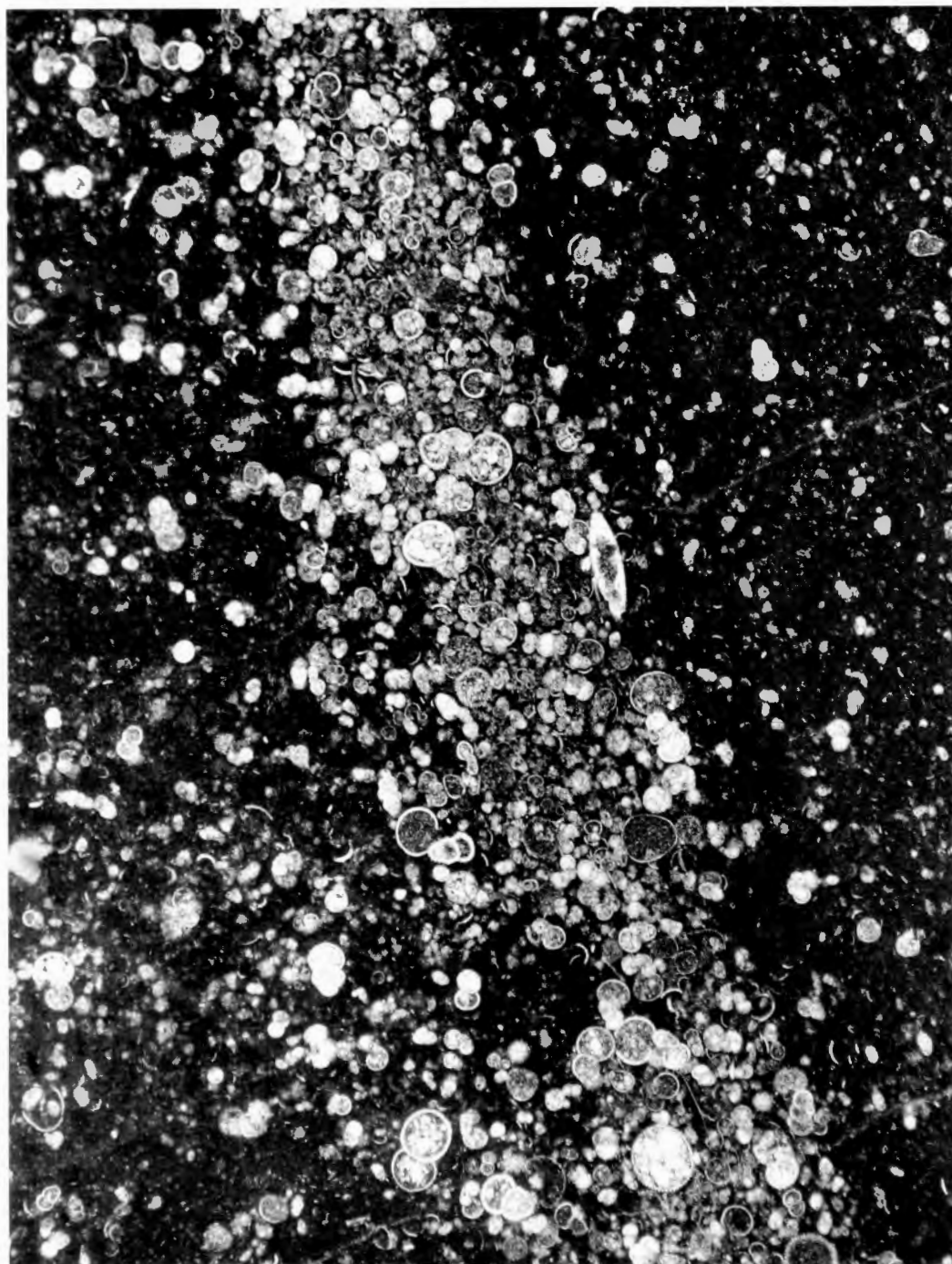
Lithothamnium (X 40).
 LOWER PLEISTOCENE of Collecchio
 12 well, Emilia, Italy.





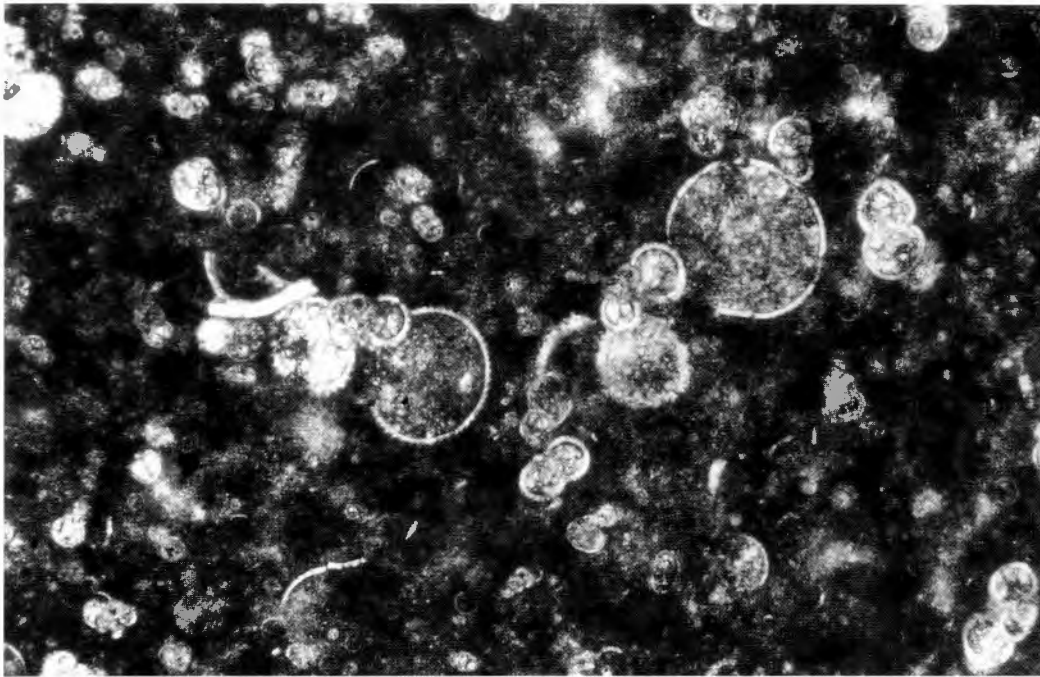
"Small globigerinids" (X 50).
 LOWERMOST PALEOCENE of Piropo
 2 well, Adriatic Sea.

At the end of the MAASTRICHTIAN *Globotruncanidae* became extinct. The beginning of the PALEOCENE is characterized by foraminiferal planktonic assemblages of very small size.



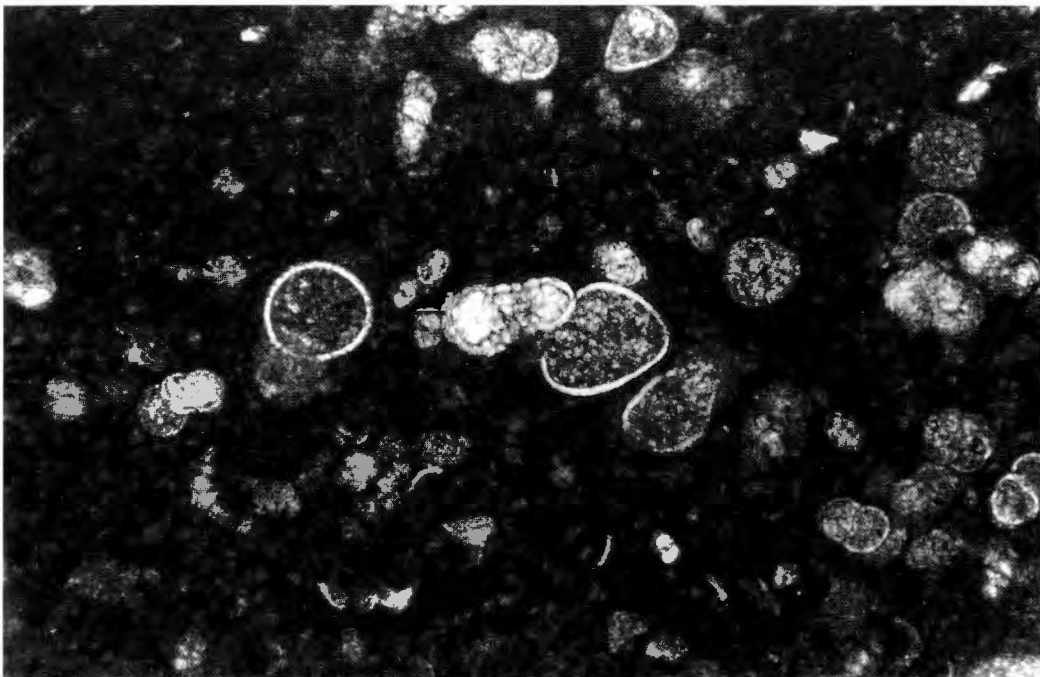
Planktonic assemblage with "Subbotina"
pseudobulloides (PLUMMER), *Morozovella*
trinidadensis (BOLLI) and *Globigerinidae*
 (X 50).
 LOWER PALEOCENE of Gubbio, Umbria,
 Italy.

The EARLY PALEOCENE is characterized by the nearly total absence of conical forms.



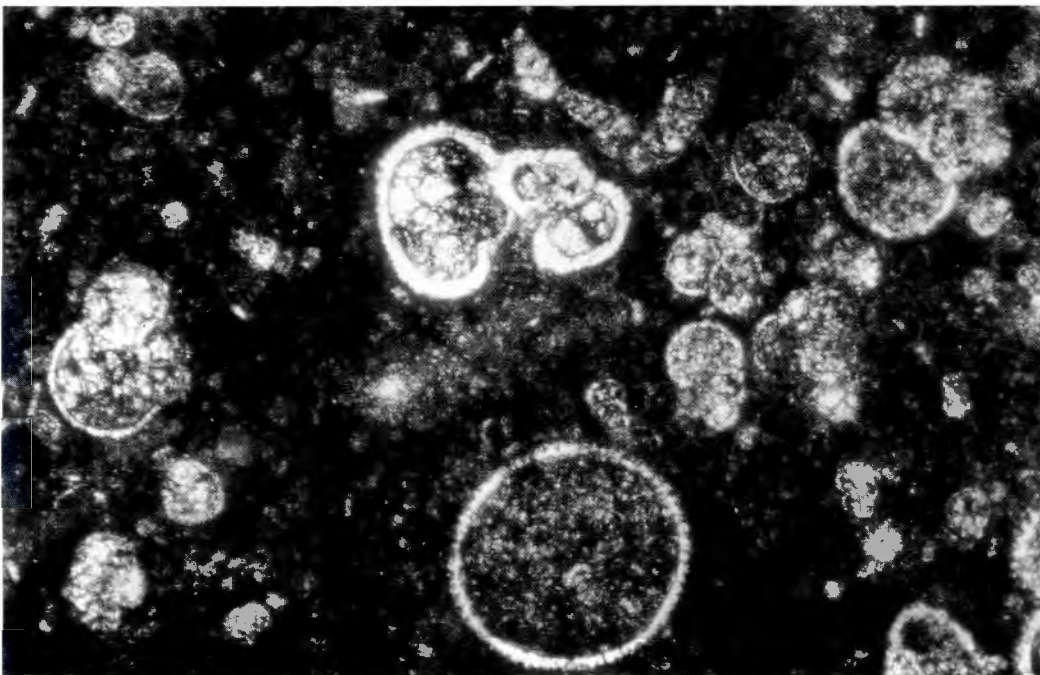
"Subbotina" pseudobulloides (PLUMMER)
(X 100).
LOWER PALEOCENE of Piropo 2 well,
Adriatic Sea.

PALEOCENE			EOCENE			OLIGOCENE			MIOCENE			PLIOCENE	PLEISTOCENE
E.	M.	L.	E.	M.	L.	E.	M.	L.	E.	M.	L.		



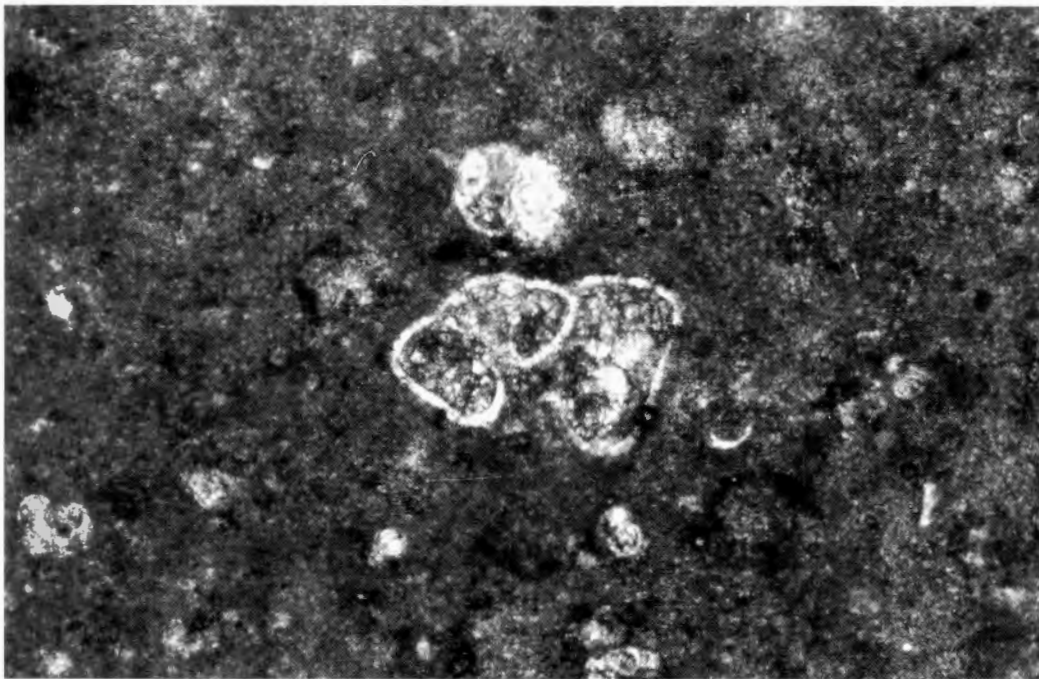
Planorotalites compressa (PLUMMER)
(X 160).
MIDDLE PALEOCENE of Monte Conero,
Marche, Italy.

PALEOCENE			EOCENE			OLIGOCENE			MIOCENE			PLIOCENE	PLEISTOCENE
E.	M.	L.	E.	M.	L.	E.	M.	L.	E.	M.	L.		



Morozovella uncinata (BOLL) (X 130).
MIDDLE PALEOCENE of Piropo 2 well,
Adriatic Sea.

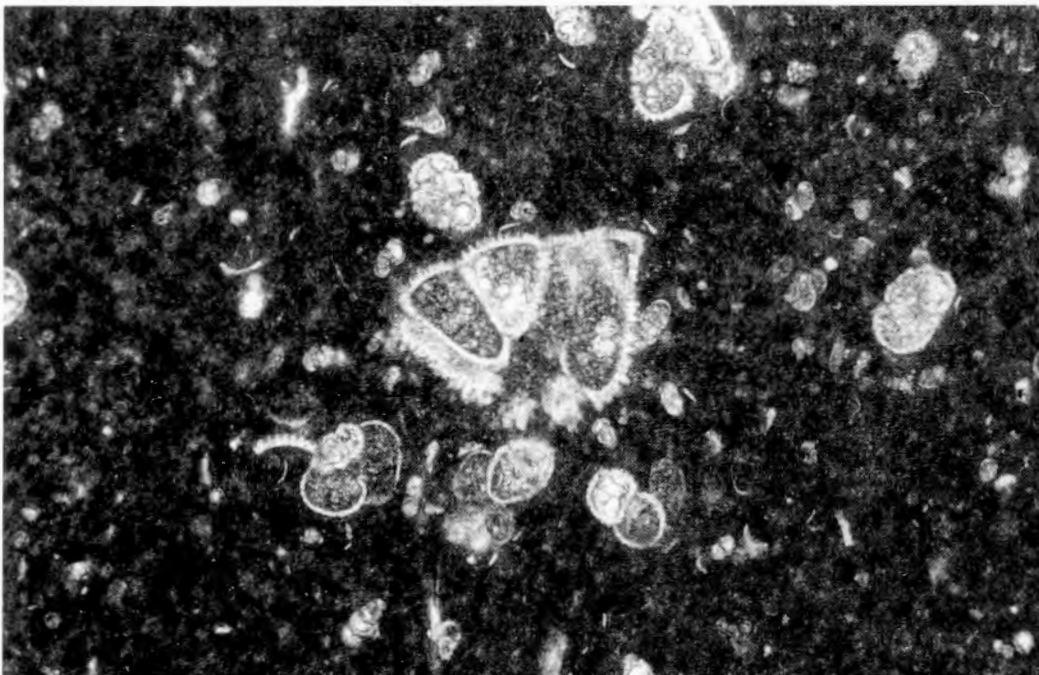
PALEOCENE			EOCENE			OLIGOCENE			MIOCENE			PLIOCENE	PLEISTOCENE
E.	M.	L.	E.	M.	L.	E.	M.	L.	E.	M.	L.		



Morozovella angulata (WHITE) (X 100).
MIDDLE PALEOCENE of Pirolo 2 well,
Adriatic Sea.

PALEOCENE			EOCENE			OLIGOCENE			MIOCENE			PLIOCENE	PLEISTOCENE
E.	M.	L.	E.	M.	L.	E.	M.	L.	E.	M.	L.		

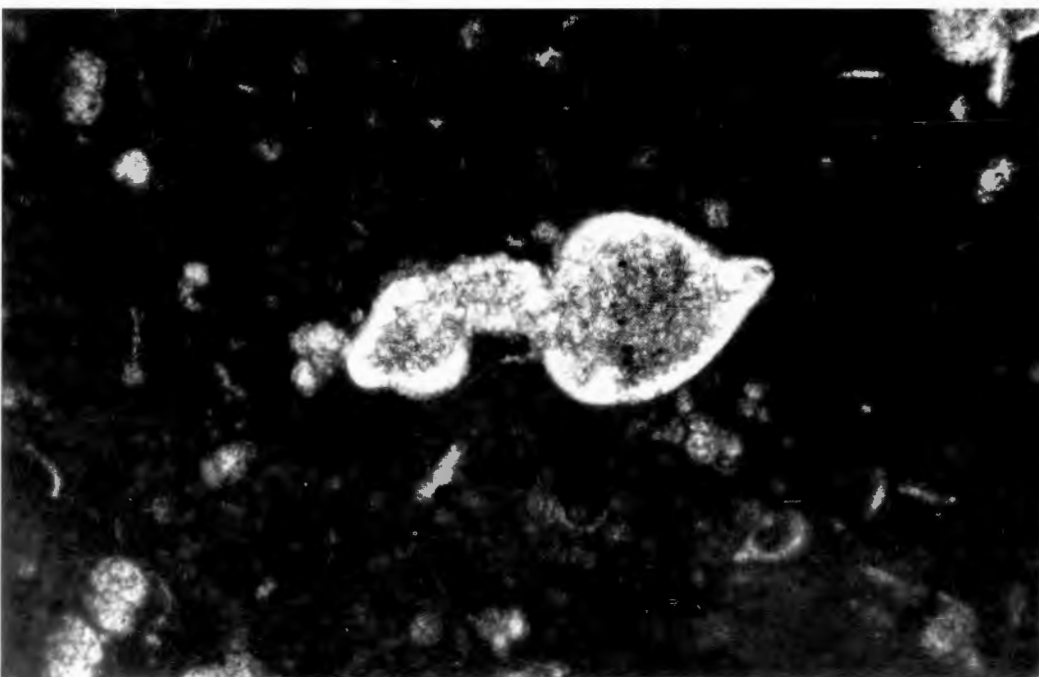
This is the first angular-conical form.



Morozovella conicotruncata (SUBBOTINA)
(X 90).
MIDDLE PALEOCENE of Monte Conero,
Marche, Italy.

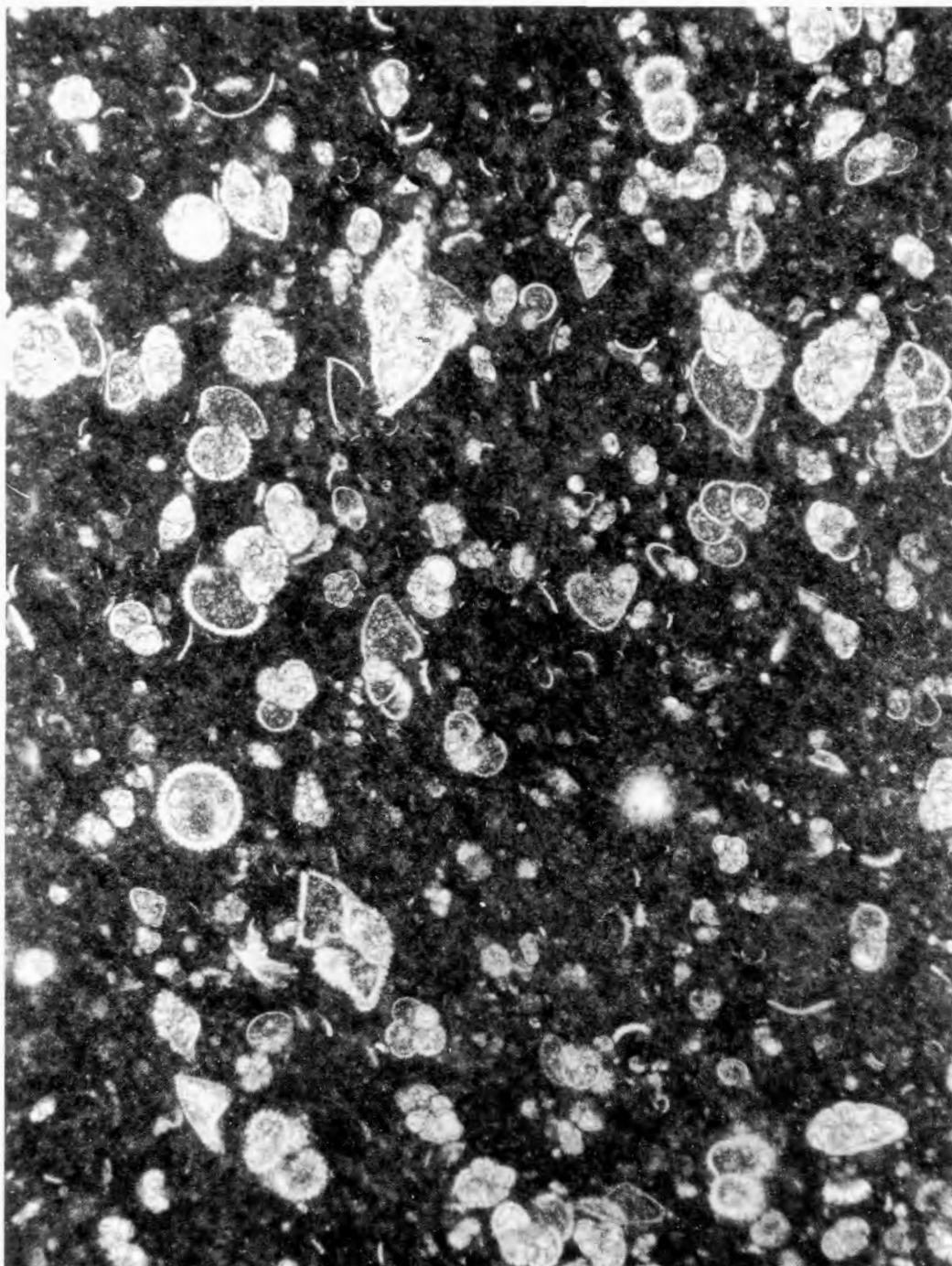
PALEOCENE			EOCENE			OLIGOCENE			MIOCENE			PLIOCENE	PLEISTOCENE
E.	M.	L.	E.	M.	L.	E.	M.	L.	E.	M.	L.		

The conical forms become frequent in the upper part
of the MIDDLE PALEOCENE.



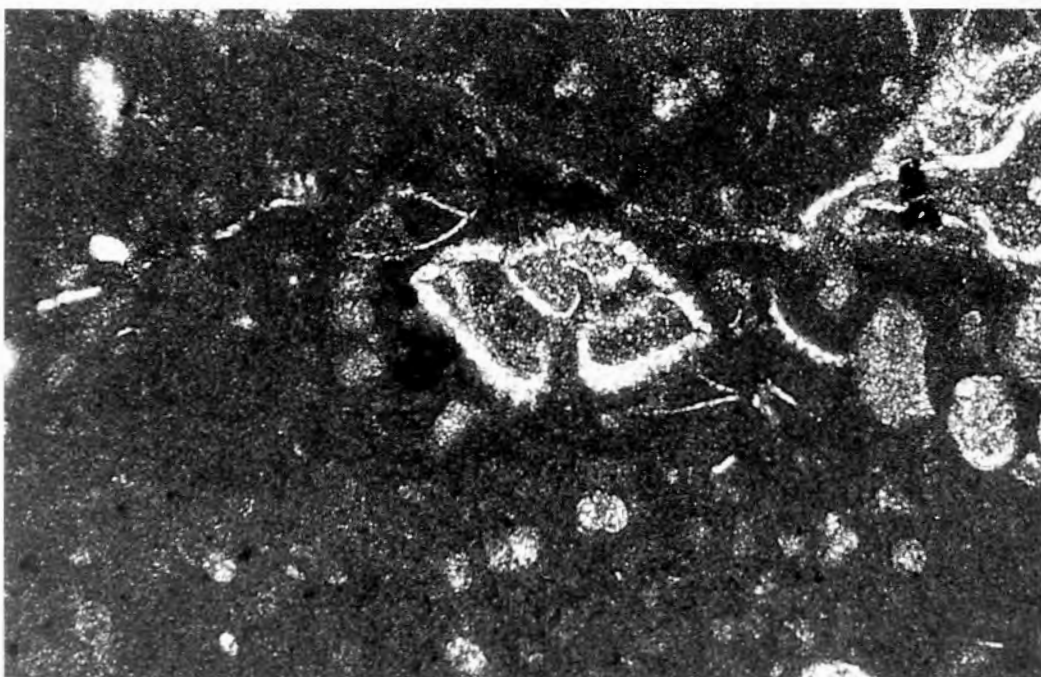
Planorotalites ehrenbergi (BOLLI) (X 130).
MIDDLE PALEOCENE of Madonna della
Croce 2 well, Abruzzo, Italy.

PALEOCENE			EOCENE			OLIGOCENE			MIOCENE			PLIOCENE	PLEISTOCENE
E.	M.	L.	E.	M.	L.	E.	M.	L.	E.	M.	L.		



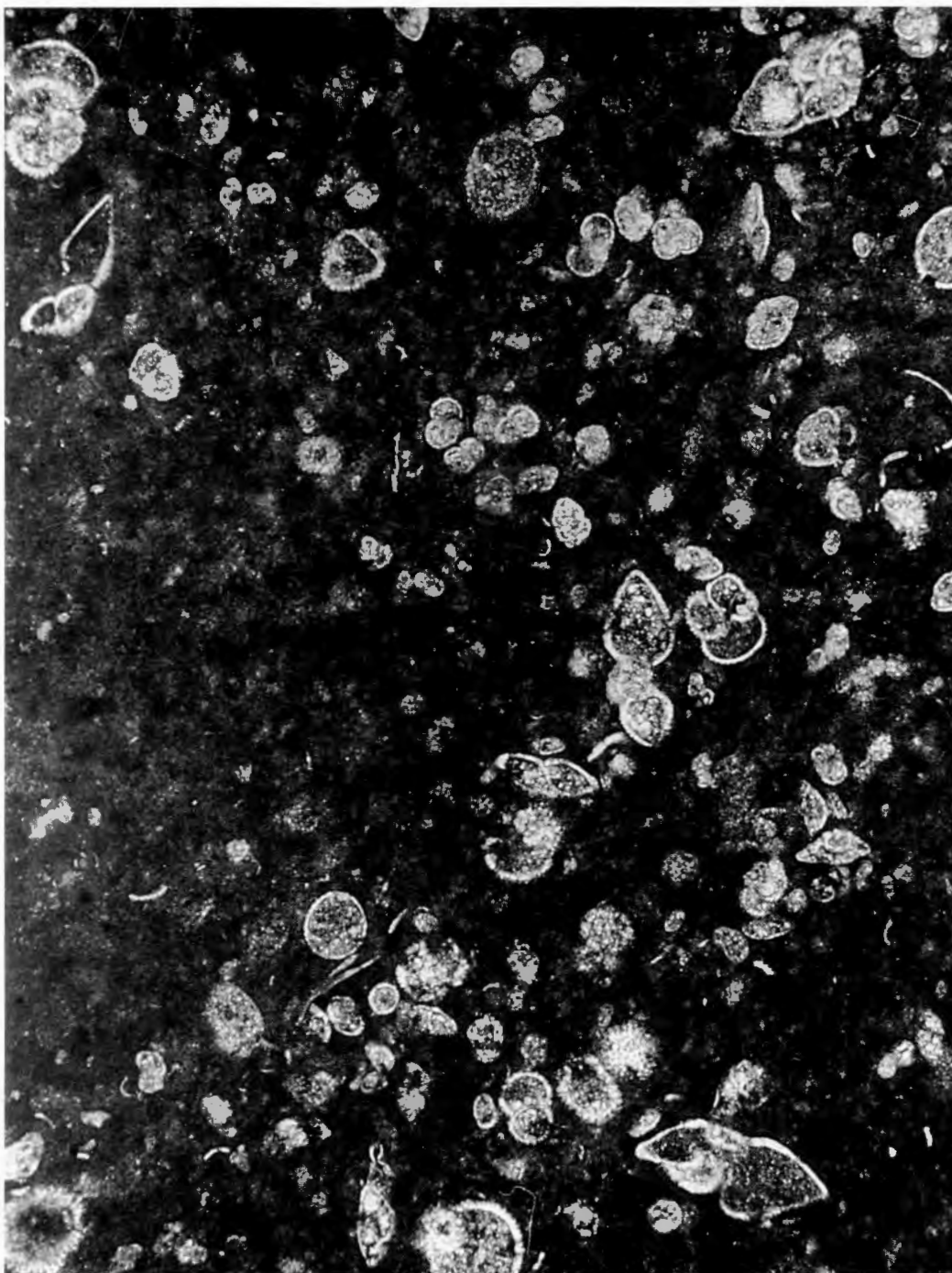
Planktonic assemblage with *Planorotalites pusilla pusilla* (BOLLI) (X 90).
MIDDLE PALEOCENE of Madonna della
Croce 2 well, Abruzzo, Italy.

This very small form is frequent at the MIDDLE-LATE
PALEOCENE boundary.



Planorotalites pusilla pusilla (BOLLI) (X 160).
MIDDLE PALEOCENE of Madonna della
Croce 2 well, Abruzzo, Italy.

PALEOCENE			EOCENE			OLIGOCENE			MIOCENE			PLIOCENE	PLEISTOCENE
E.	M.	L.	E.	M.	L.	E.	M.	L.	E.	M.	L.		
■													

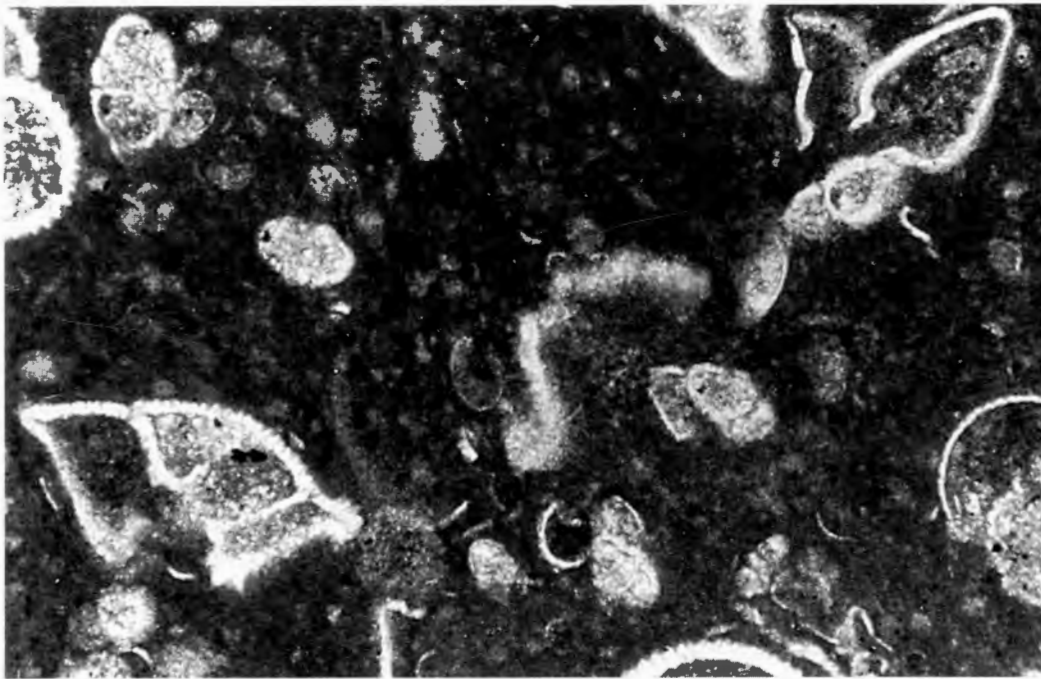


Planktonic assemblage with *Planorotalites pseudomenardii* (BOLL) (X 70).
UPPER PALEOCENE of Piropo 2 well,
Adriatic Sea.



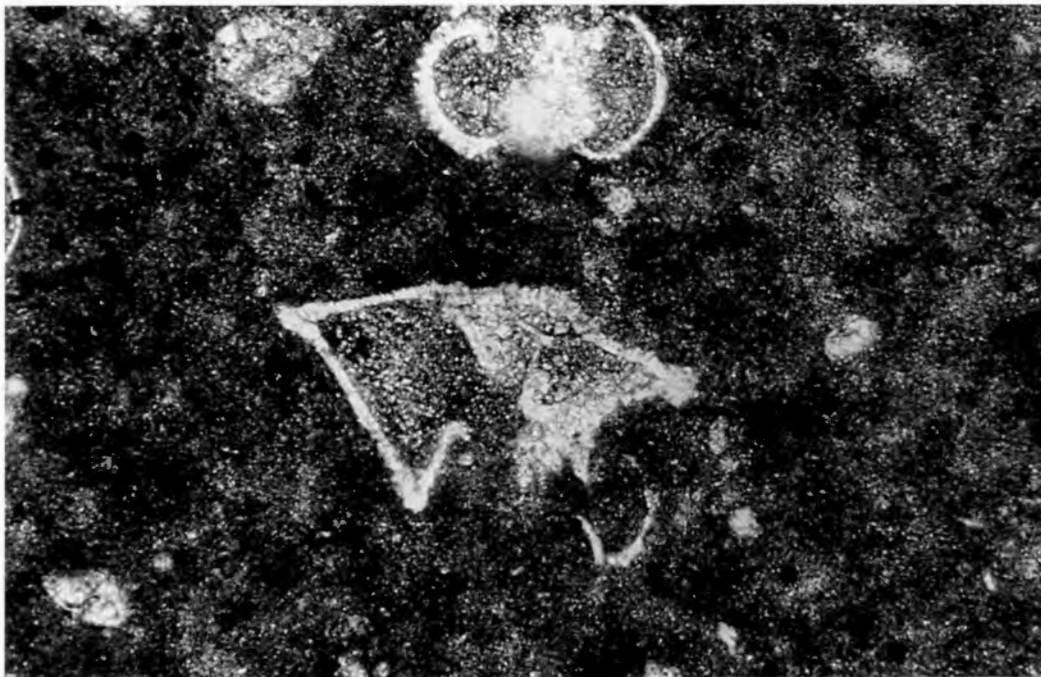
Planorotalites pseudomenardii (BOLL)
(X 140).
UPPER PALEOCENE of Piropo 2 well,
Adriatic Sea.

PALEOCENE			EOCENE			OLIGOCENE			MIOCENE			PLIOCENE	PLEISTOCENE
E.	M.	L.	E.	M.	L.	E.	M.	L.	E.	M.	L.		



Morozovella gr. *velascoensis* (CUSHMAN).
Planorotalites pseudomenardii (BOLLI) is present (X 130).
 UPPER PALEOCENE of Madonna della Croce 2 well, Abruzzo, Italy.

The LATE PALEOCENE is characterized by large and ornamented forms.

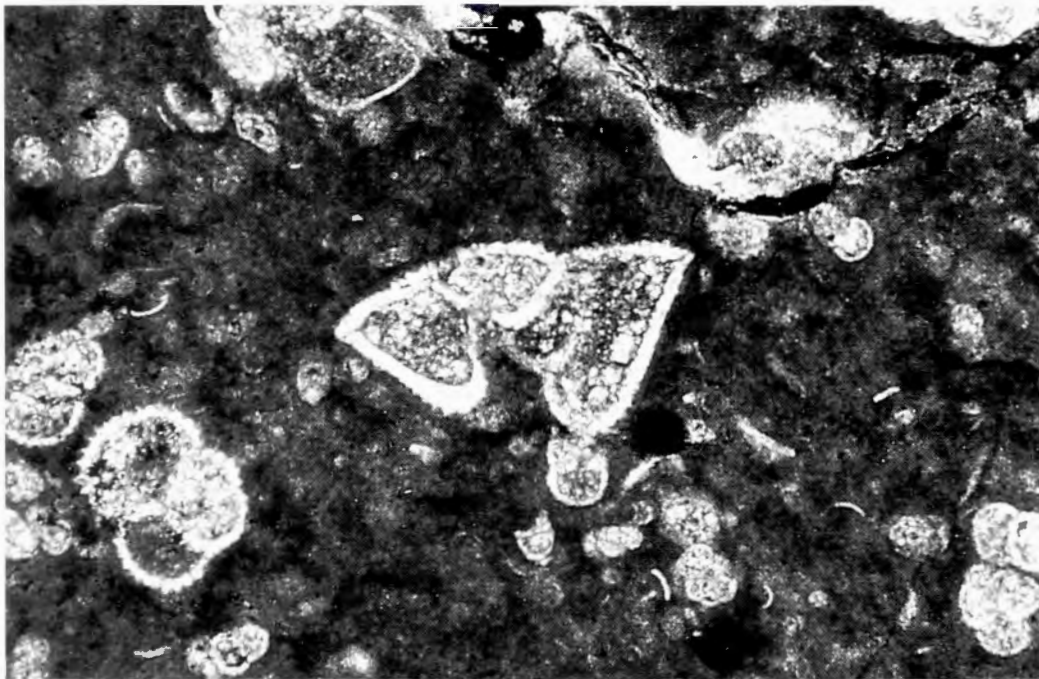


Morozovella velascoensis (CUSHMAN) (X 140).
 UPPER PALEOCENE of Pirolo 2 well, Adriatic Sea.

PALEOCENE			EOCENE			OLIGOCENE			MIOCENE			PLIOCENE	PLEISTOCENE
E.	M.	L.	E.	M.	L.	E.	M.	L.	E.	M.	L.		



Morozovella velascoensis (CUSHMAN) (X 140).
 UPPER PALEOCENE of Tang-e-Sheniz, Zagros, Iran.

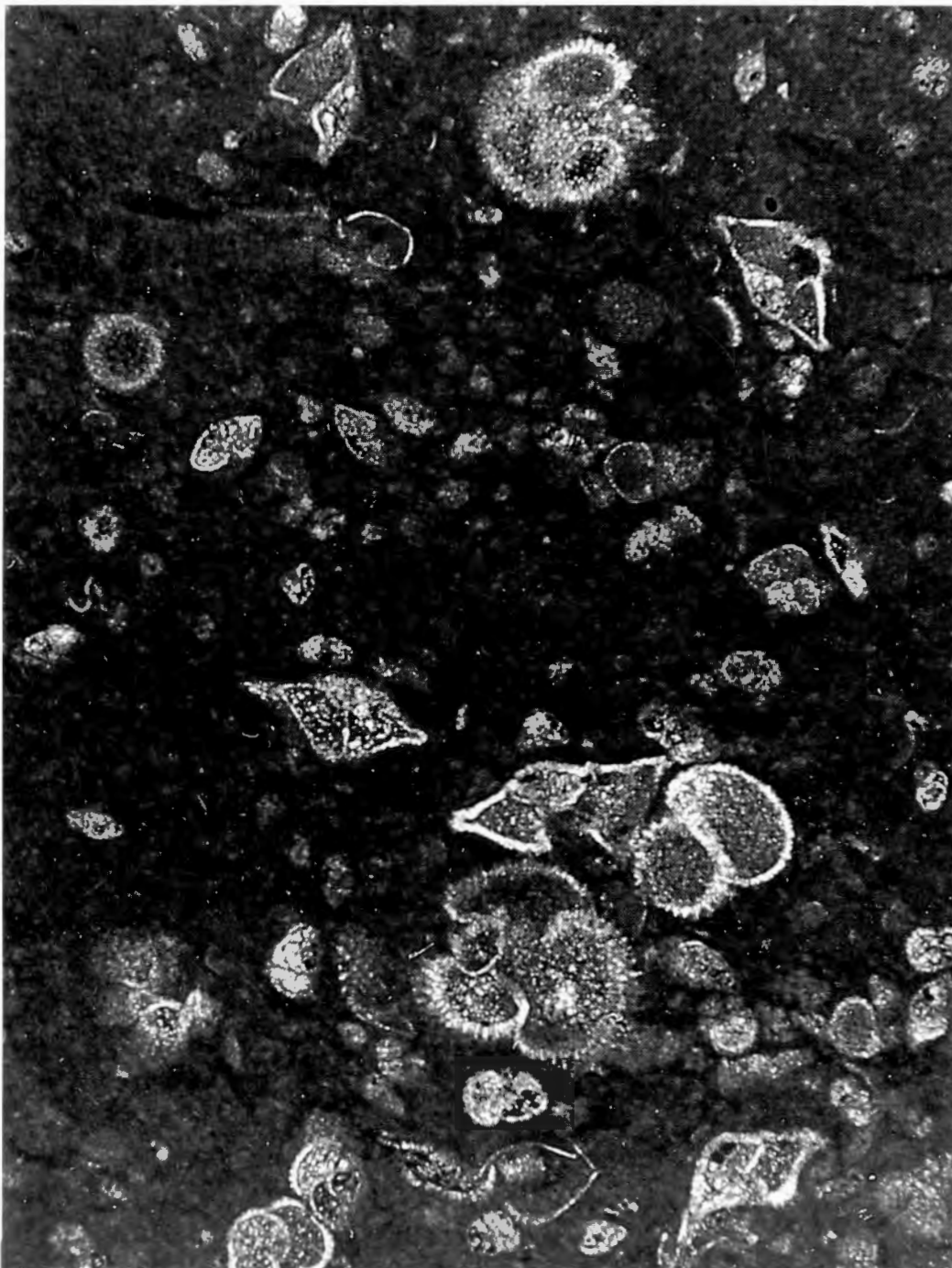


COLL.: EARTH SCIENCES DEP. UNIV. OF MILAN

Morozovella aequa (CUSHMAN & RENZ)
(X 140).
UPPERMOST PALEOCENE-LOWERMOST
EOCENE of Gubbio, Umbria, Italy.

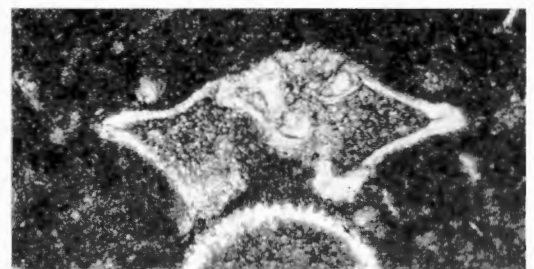
PALEOCENE			EOCENE			OLIGOCENE			MIOCENE			PLIOCENE	PLEISTOCENE
E.	M.	L.	E.	M.	L.	E.	M.	L.	E.	M.	L.		

This species is very frequent at the PALEOCENE-
EOCENE boundary.

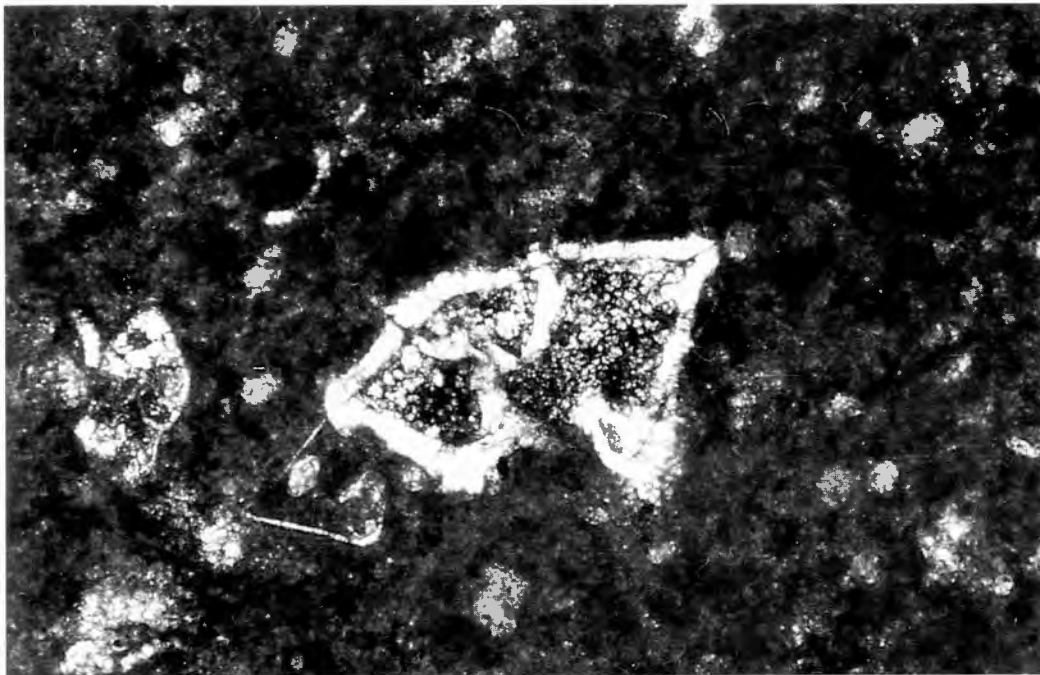


Morozovella gracilis (BOLLI) (X 80).
Detail (X 100).
LOWER EOCENE of Monte Conero,
Marche, Italy.

PALEOCENE			EOCENE			OLIGOCENE			MIOCENE			PLIOCENE	PLEISTOCENE
E.	M.	L.	E.	M.	L.	E.	M.	L.	E.	M.	L.		



Ornamented forms become particularly frequent
during the EARLY EOCENE and in the lower part of
the MIDDLE EOCENE.



Morozovella gr. *subbotinae* (MOROZOVA) (X 140).
LOWER EOCENE of Piroppo 2 well,
Adriatic Sea.

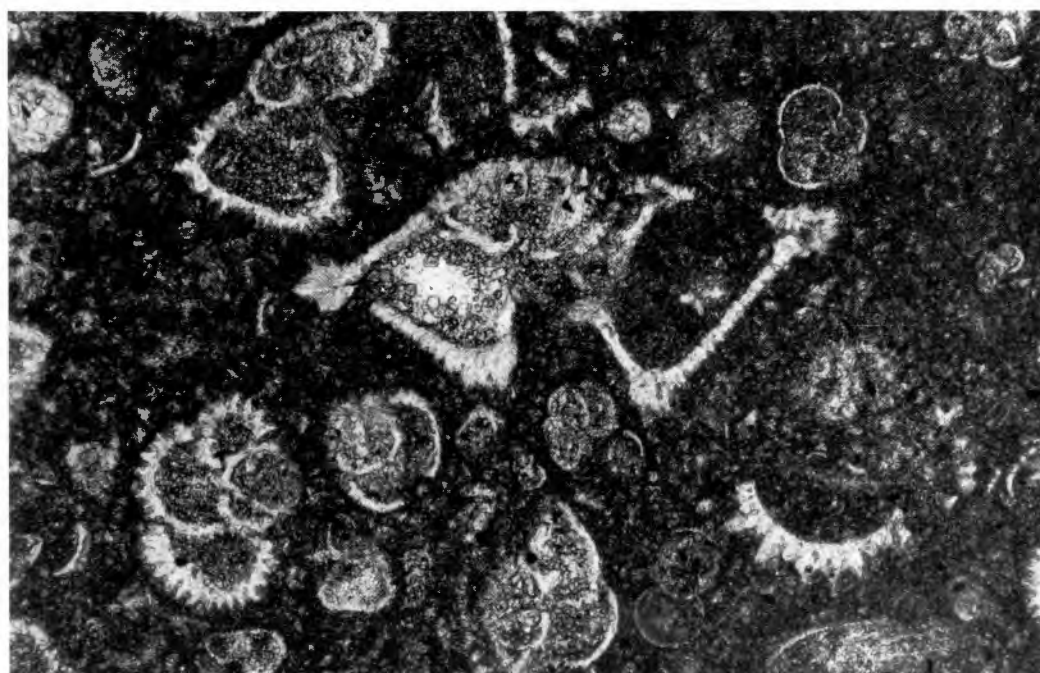
PALEOCENE			EOCENE			OLIGOCENE			MIOCENE			PLIOCENE	PLEISTOCENE
E.	M.	L.	E.	M.	L.	E.	M.	L.	E.	M.	L.		

This form differs from *Morozovella aequa* in having a spiny keel.



Morozovella aragonensis (NUTTALL) (X 75).
LOWER EOCENE of Lavello 2 well,
Basilicata, Italy.

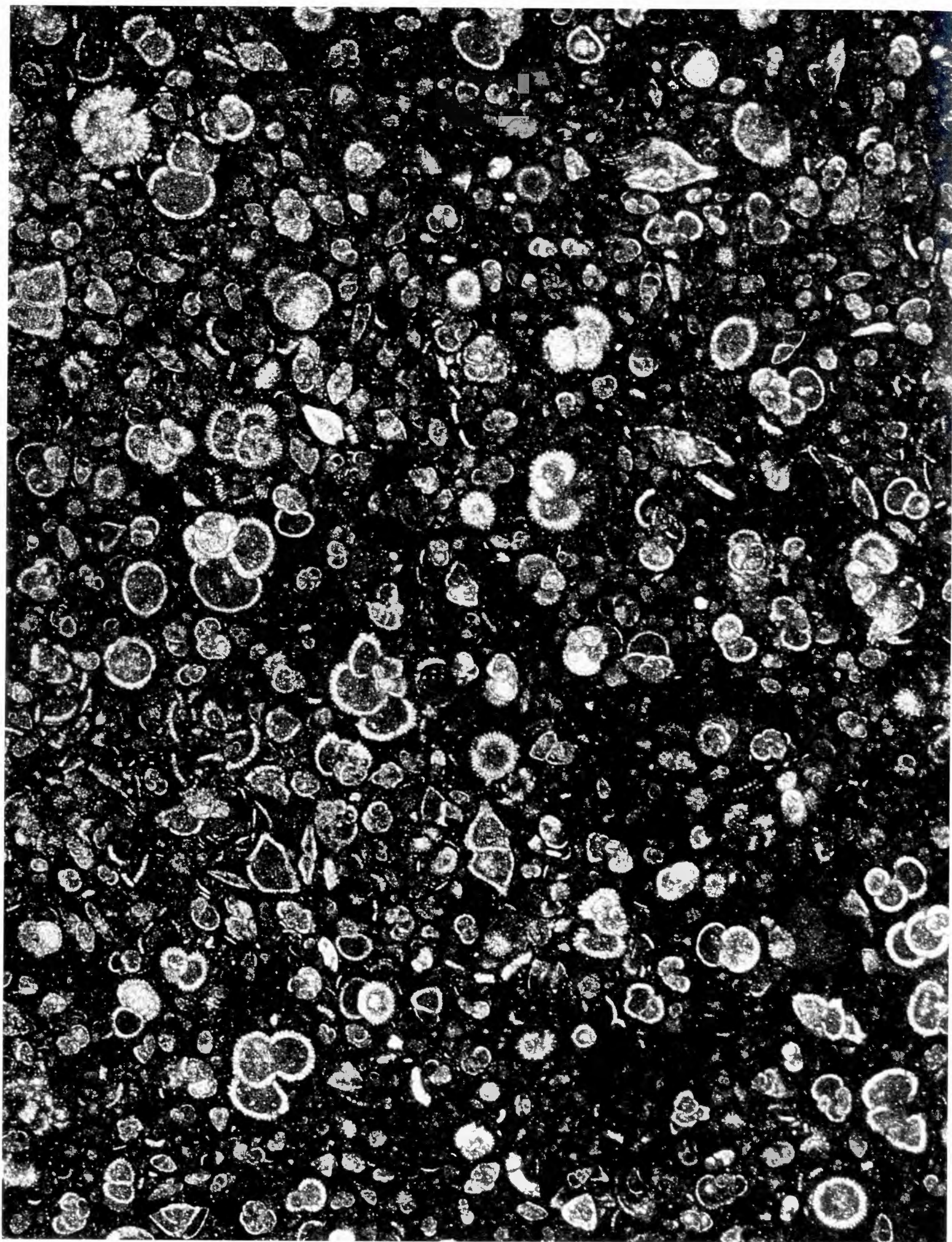
PALEOCENE			EOCENE			OLIGOCENE			MIOCENE			PLIOCENE	PLEISTOCENE
E.	M.	L.	E.	M.	L.	E.	M.	L.	E.	M.	L.		

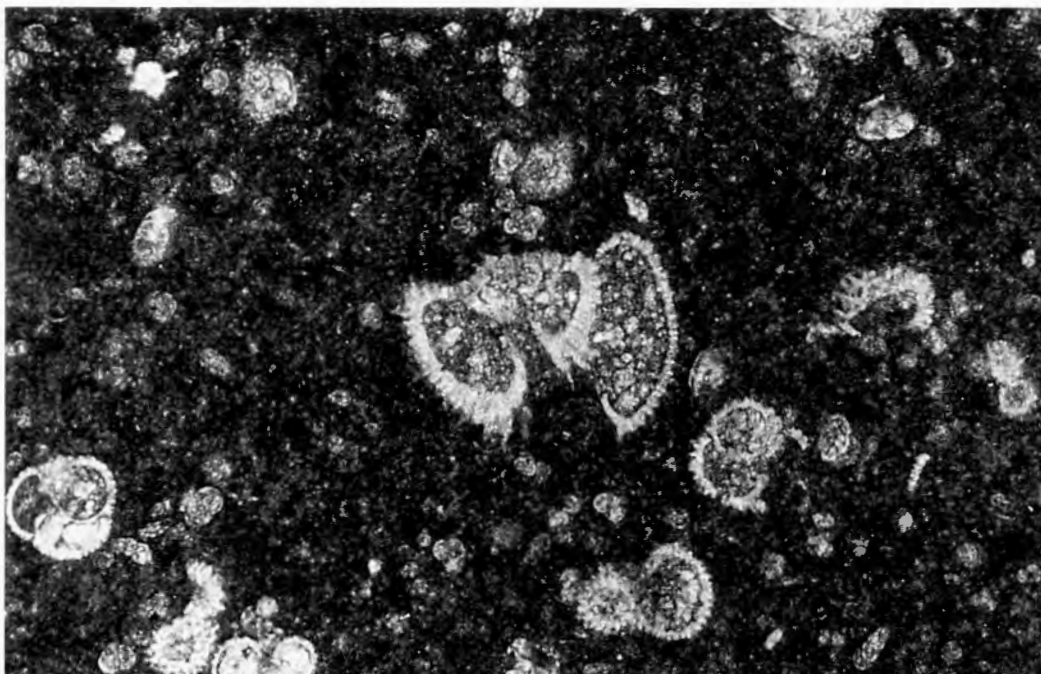


Morozovella spinulosa (CUSHMAN) (X 120).
MIDDLE EOCENE of Modica 1 well, Sicily,
Italy.

PALEOCENE			EOCENE			OLIGOCENE			MIOCENE			PLIOCENE	PLEISTOCENE
E.	M.	L.	E.	M.	L.	E.	M.	L.	E.	M.	L.		

Ornamented forms decrease during the MIDDLE EOCENE.



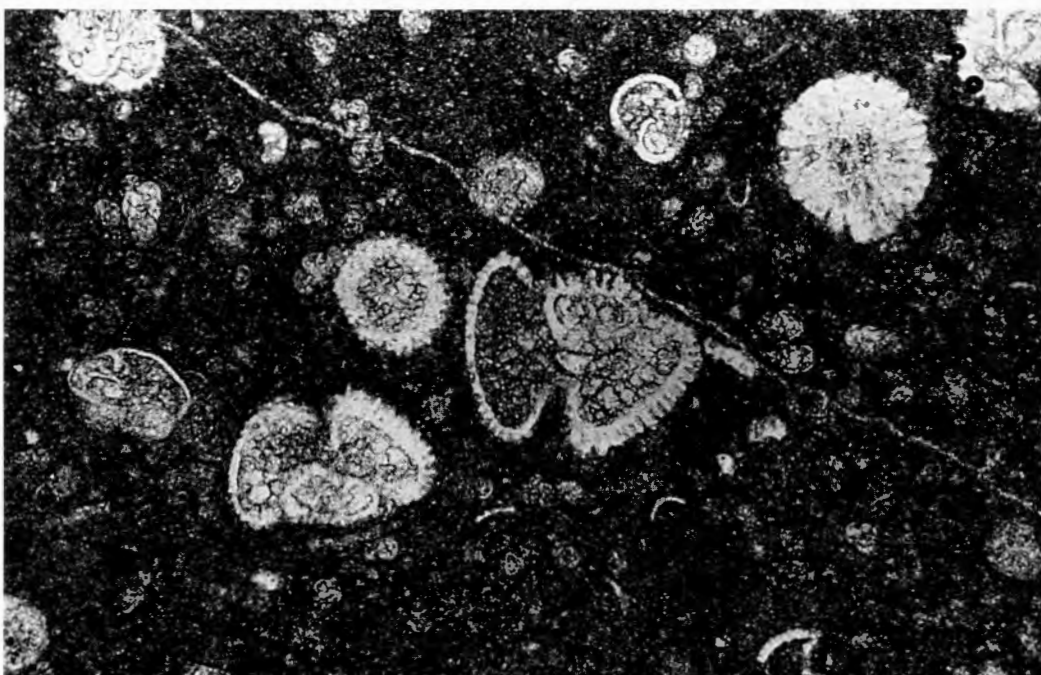


Opposite page
Planktonic assemblage with *Morozovella spinulosa* (CUSHMAN), *Morozovella lehneri* (CUSHMAN & JARVIS), *Acarinina topilensis* (CUSHMAN), *Globigerina senni* (BECKMANN), *Globorotaliidae*, *Globigerinidae*, (X 70).
MIDDLE EOCENE of Modica 1 well, Sicily, Italy.

Acarinina bullbrooki (BOLLI) (X 90).
MIDDLE EOCENE of Madonna della Croce 2 well, Abruzzo, Italy.

PALEOCENE			EOCENE			OLIGOCENE			MIOCENE			PLIOCENE	PLEISTOCENE
E.	M.	L.	E.	M.	L.	E.	M.	L.	E.	M.	L.		

This is a typical form of the MIDDLE EOCENE.



Acarinina bullbrooki (BOLLI) (X 90).
MIDDLE EOCENE of Madonna della Croce 2 well, Abruzzo, Italy.



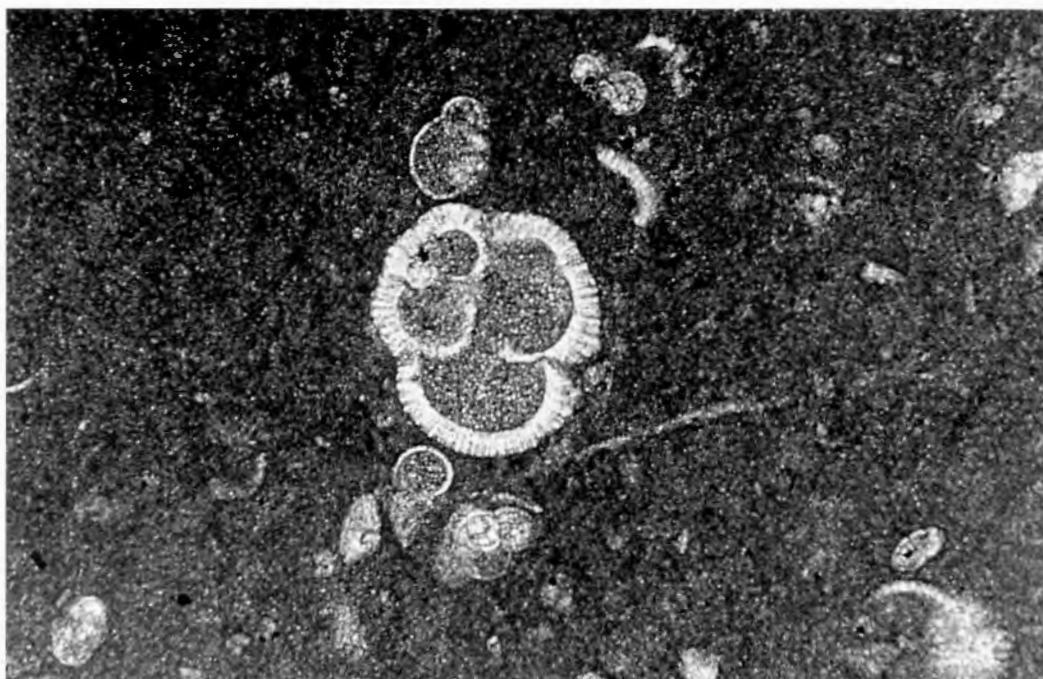
Acarinina topilensis (CUSHMAN) (X 100) (left).
MIDDLE EOCENE of Rosella 1 well, Adriatic Sea.



Acarinina topilensis (CUSHMAN) (X 90) (right).
MIDDLE EOCENE of Modica 1 well, Sicily, Italy.

PALEOCENE			EOCENE			OLIGOCENE			MIOCENE			PLIOCENE	PLEISTOCENE
E.	M.	L.	E.	M.	L.	E.	M.	L.	E.	M.	L.		

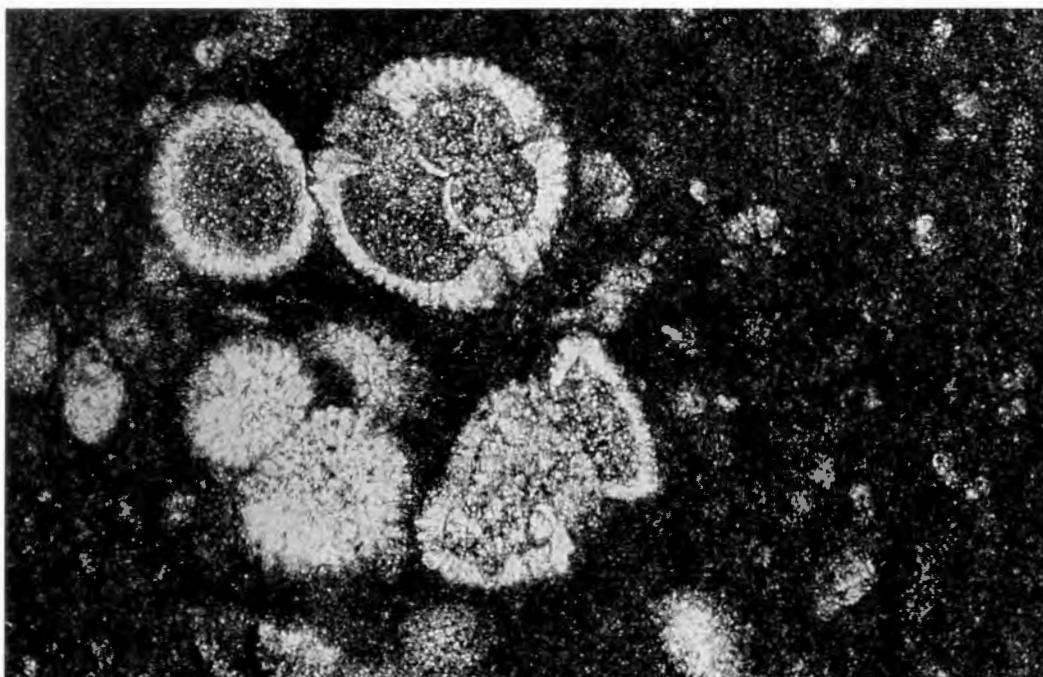
Ornamented forms disappear at the end of the MIDDLE EOCENE.



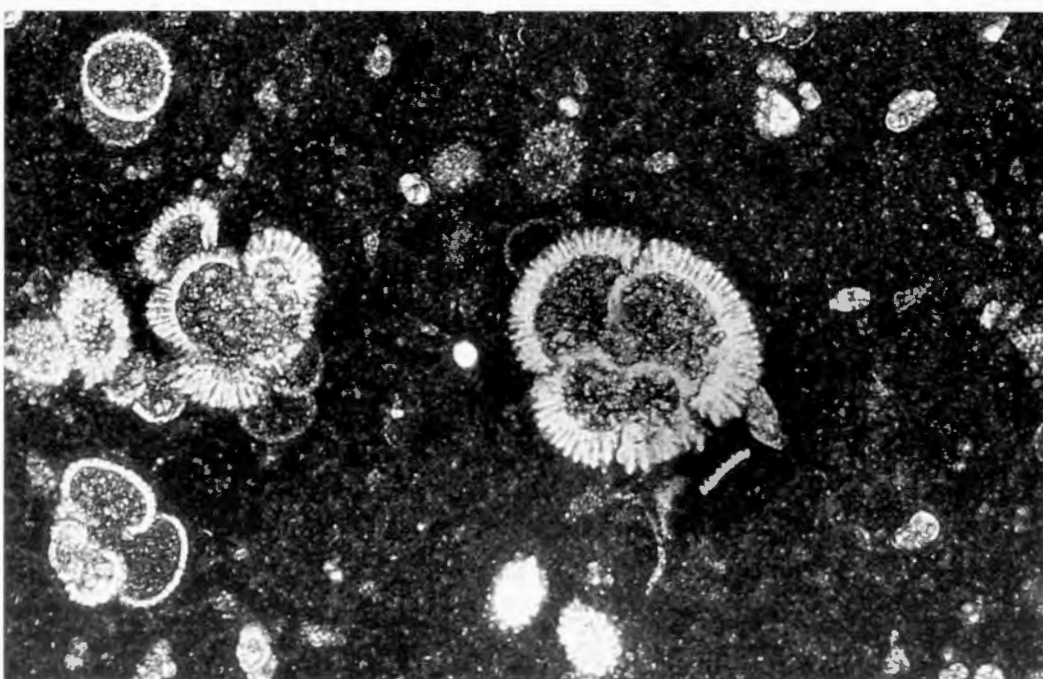
Globigerinatheka (X 150).
MIDDLE EOCENE of Monte Conero,
Marche, Italy.

PALEOCENE			EOCENE			OLIGOCENE			MIOCENE			PLIOCENE	PLEISTOCENE
E	M	L	E	M	L	E	M	L	E	M	L		

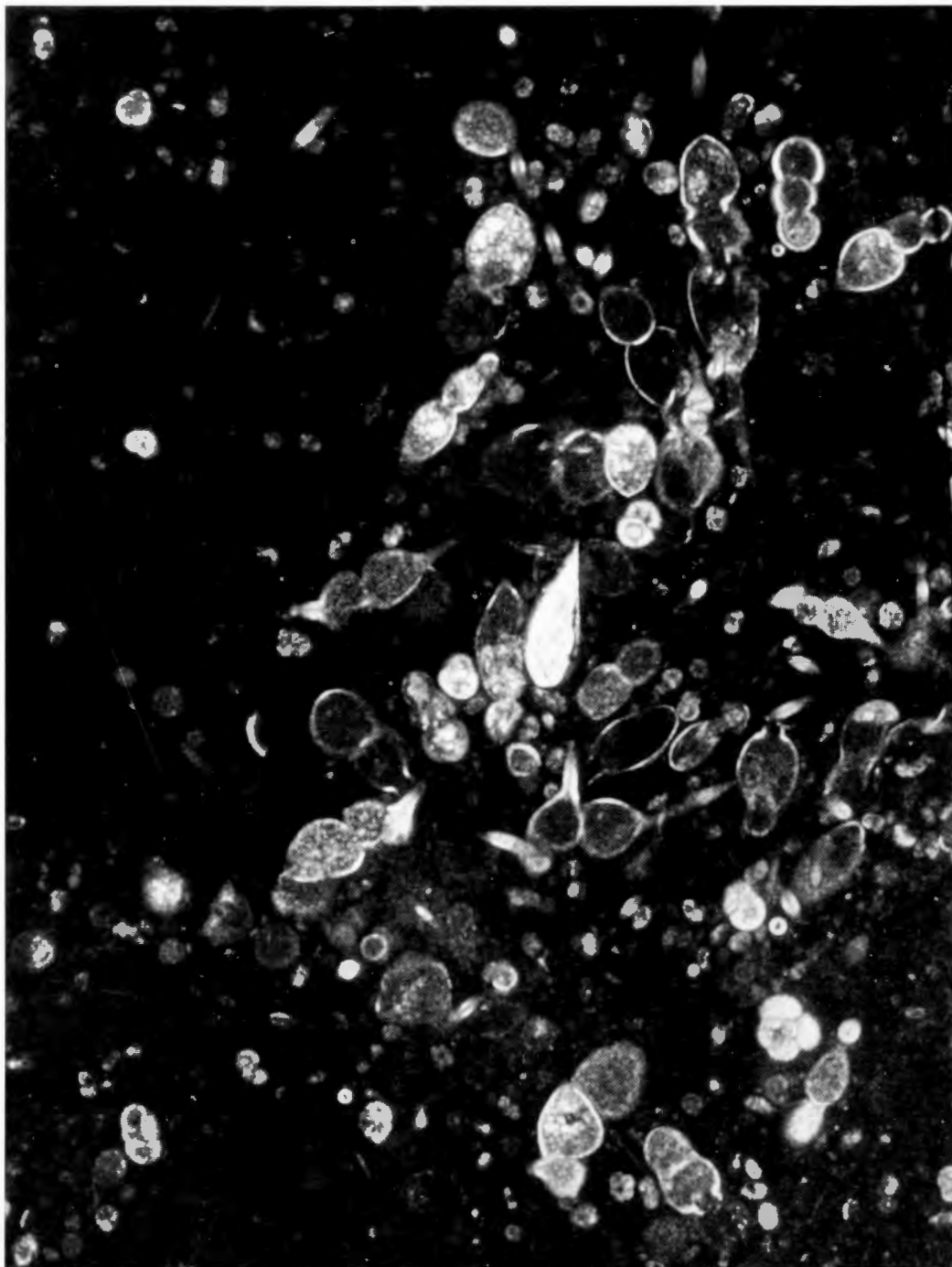
These are typical forms of the MIDDLE-LATE
EOCENE.



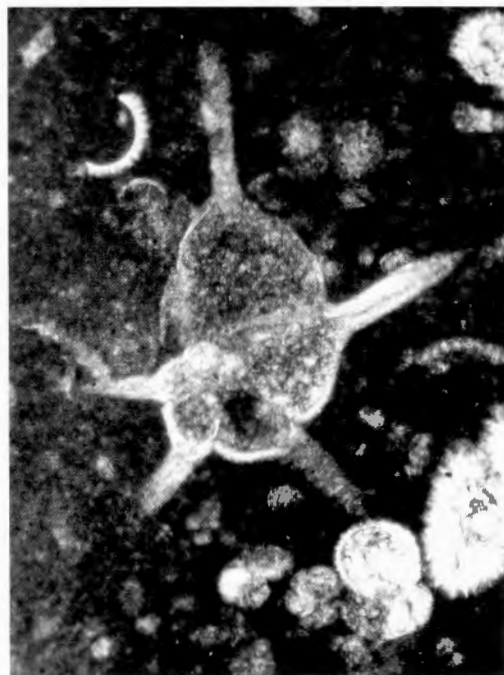
Globigerinatheka (X 90).
MIDDLE EOCENE of Monte Conero,
Marche, Italy.



Globigerinatheka (X 80).
MIDDLE EOCENE of Madonna della
Croce 2 well, Abruzzo, Italy.



Hantkenina and *Globigerinidae* (X 30).
MIDDLE EOCENE of Monte Barracu',
Sicily, Italy.



Hantkenina (X 50) (left).
MIDDLE EOCENE of Tang-e-Sheniz,
Zagros, Iran.

Hantkenina (X 85) (right).
MIDDLE EOCENE of Madonna della
Croce 2 well, Abruzzo, Italy.

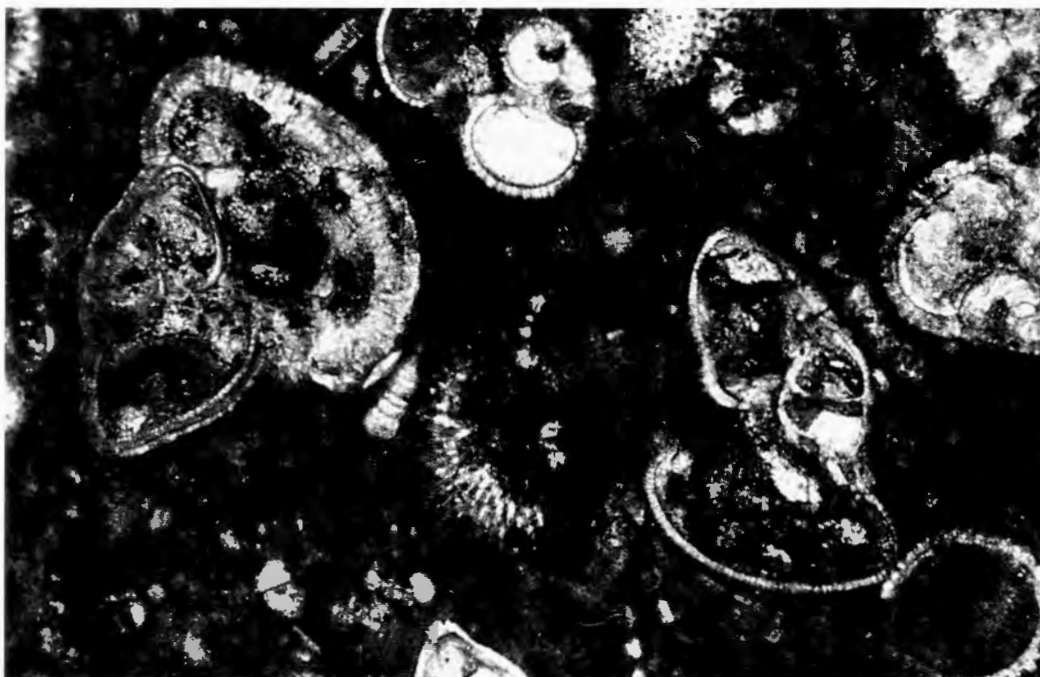
PALEOCENE			EOCENE			OLIGOCENE			MIOCENE			PLIOCENE	PLEISTOCENE
E.	M.	L.	E.	M.	L.	E.	M.	L.	E.	M.	L.		



Turborotalia cerroazulensis cerroazulensis (COLE) (X 90).
UPPER EOCENE of Massignano, Marche, Italy.

PALEOCENE			EOCENE			OLIGOCENE			MIOCENE			PLIOCENE	PLEISTOCENE
E.	M.	L.	E.	M.	L.	E.	M.	L.	E.	M.	L.		

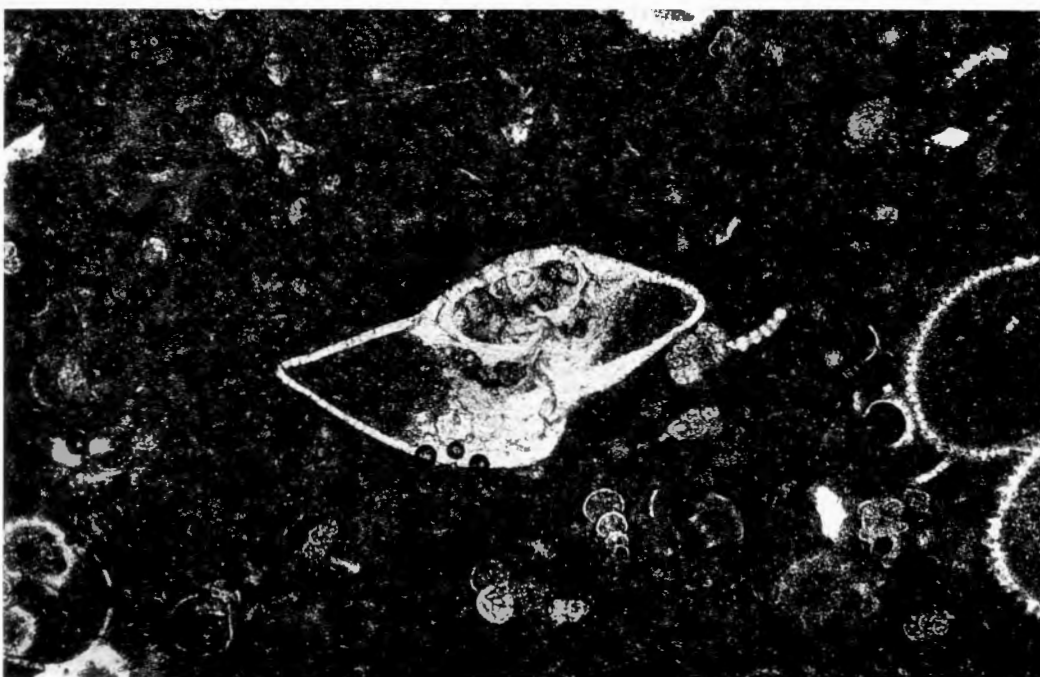
The LATE EOCENE is characterized by the absence of hispid-to-spiny forms.



Turborotalia cerroazulensis cocoaensis (CUSHMAN) and transitional form between *Turborotalia cerroazulensis cerroazulensis* and *Turborotalia cerroazulensis cocoaensis* (X 100).
UPPER EOCENE of Isnello, Sicily, Italy.

PALEOCENE			EOCENE			OLIGOCENE			MIOCENE			PLIOCENE	PLEISTOCENE
E.	M.	L.	E.	M.	L.	E.	M.	L.	E.	M.	L.		

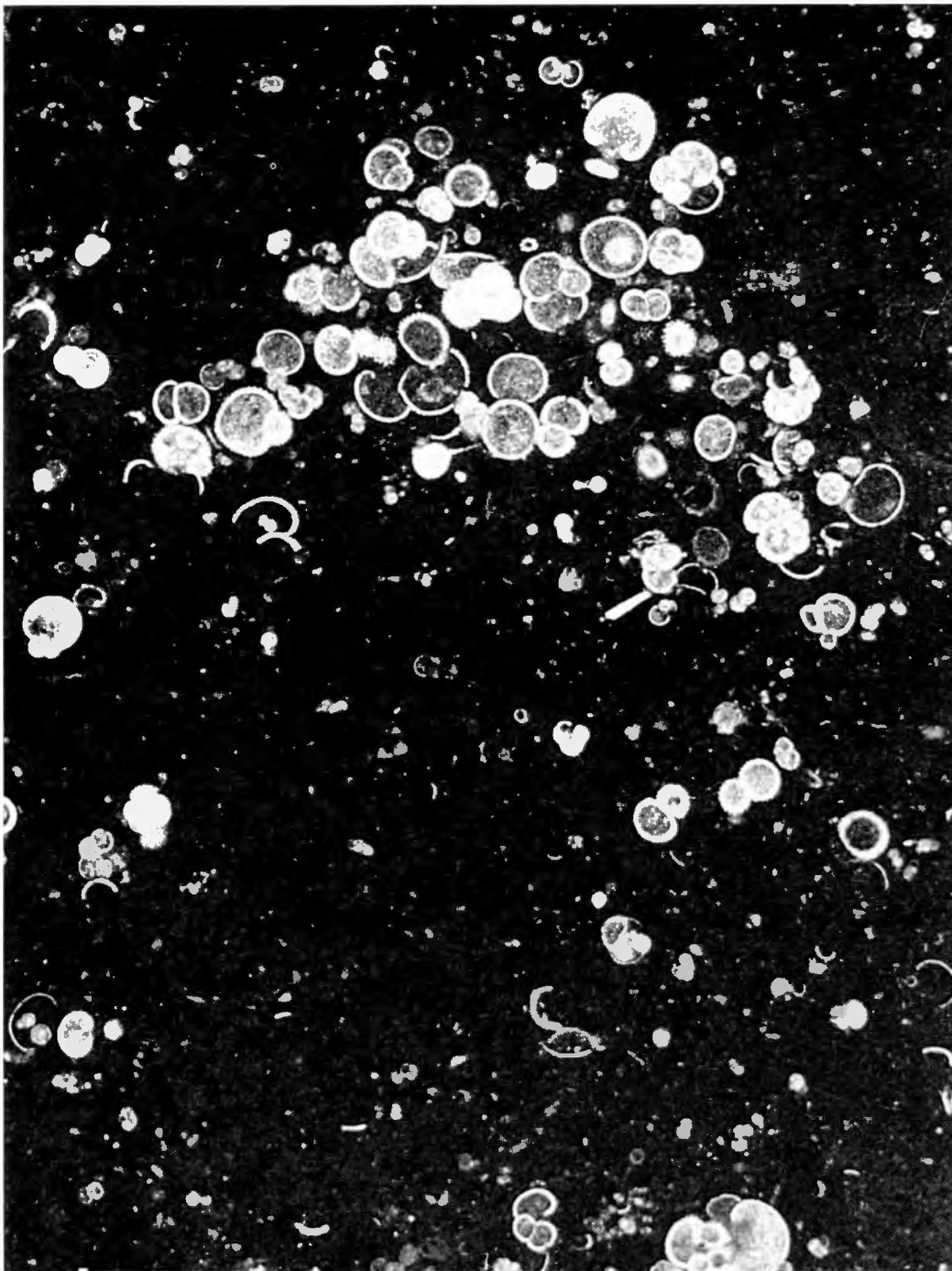
The evolutionary trend of *Turborotalia* gr. *cerroazulensis* has a significant stratigraphic value in the MIDDLE and mainly in the LATE EOCENE.



Turborotalia cerroazulensis cunialensis (TOUMARKINE & BOLLI) (X 85).
UPPER EOCENE of Madonna della Croce 2 well, Abruzzo, Italy.

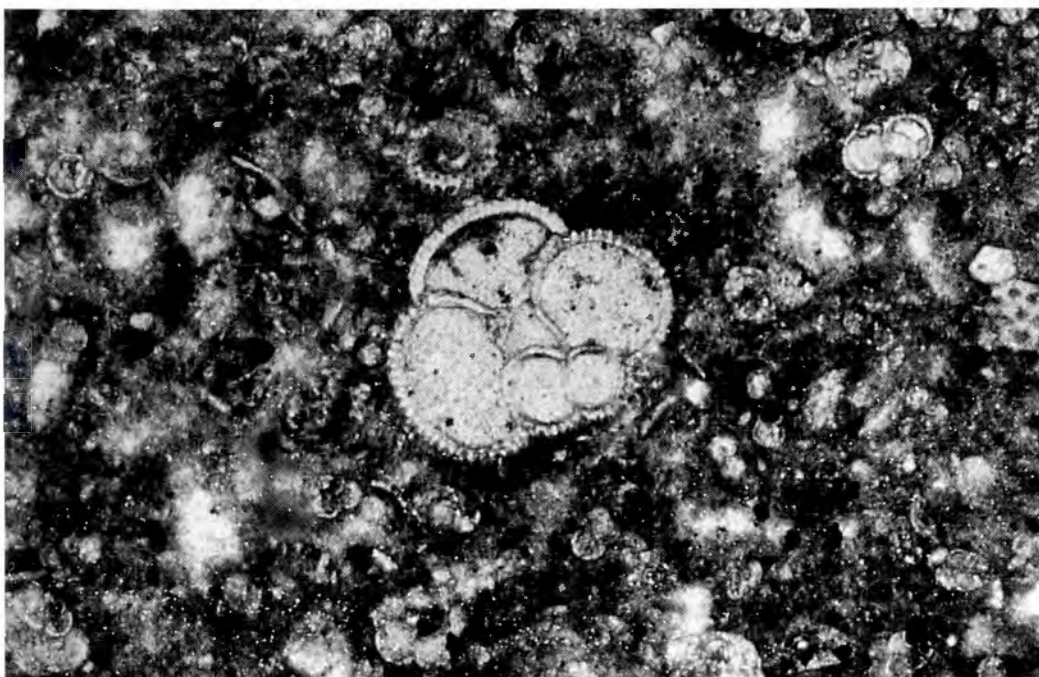
PALEOCENE			EOCENE			OLIGOCENE			MIOCENE			PLIOCENE	PLEISTOCENE
E.	M.	L.	E.	M.	L.	E.	M.	L.	E.	M.	L.		

In the LATEST EOCENE *Turborotalia* gr. *cerroazulensis* is distinguished by forms with acute peripheral margin.



Assemblage with *Globigerinidae* and small *Globorotaliidae* (X 30).
OLIGOCENE of Gubbio, Umbria, Italy.

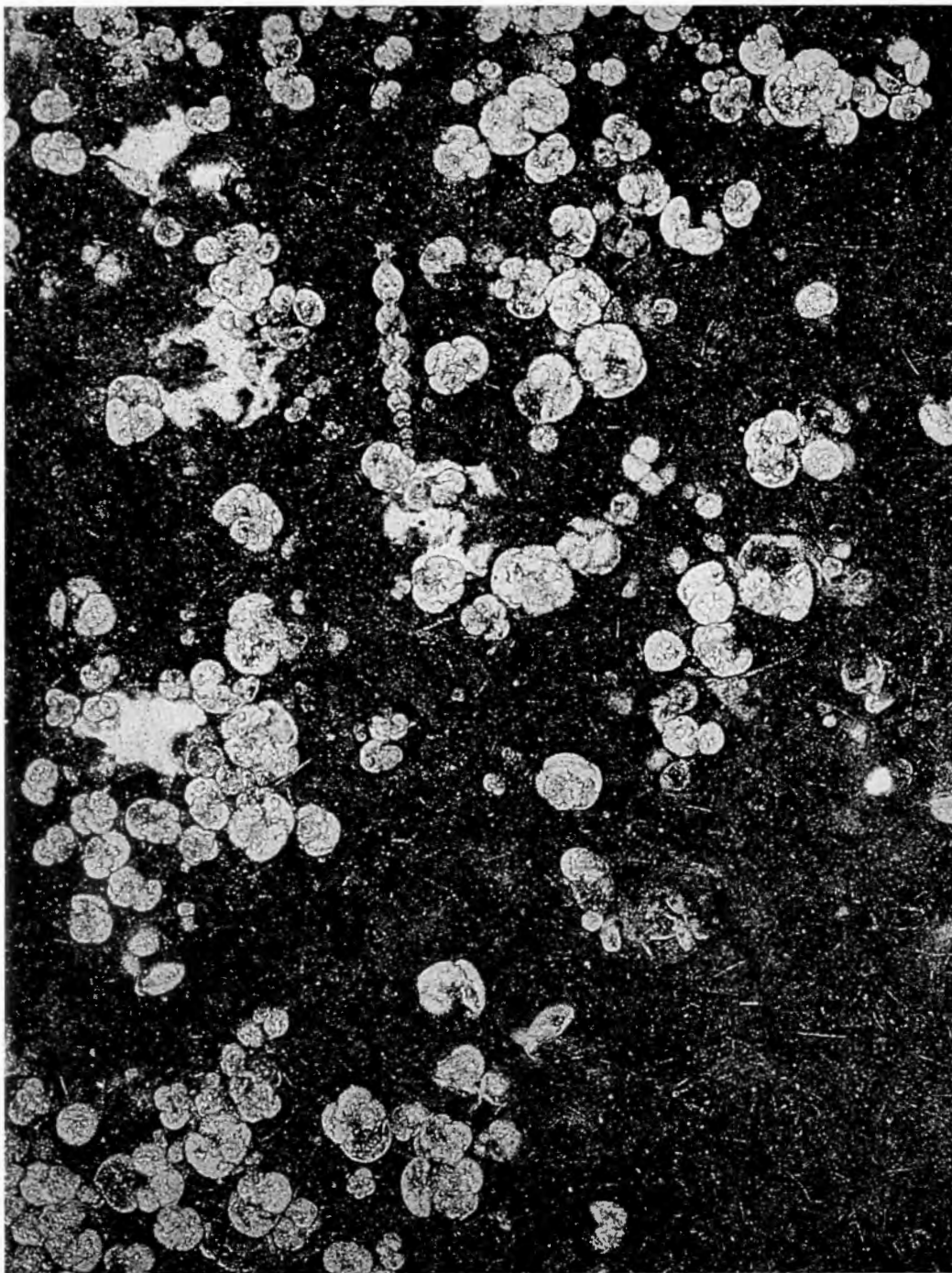
A significant general feature of OLIGOCENE planktonic assemblages is the absence of forms with acute peripheral margin.



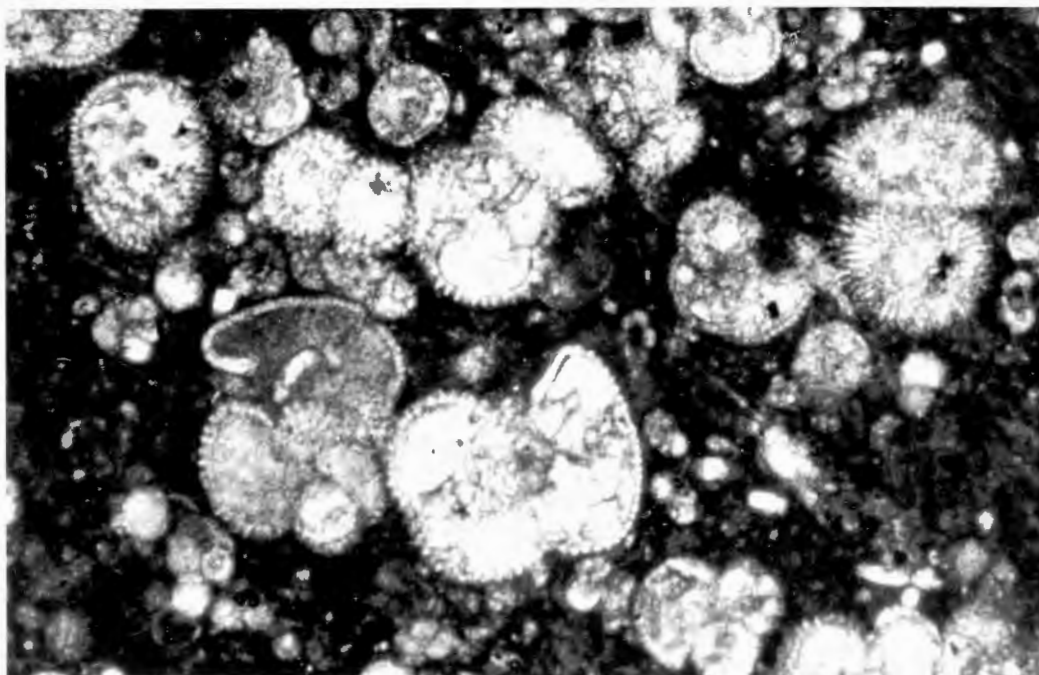
Catapsydrax (X 120).
OLIGOCENE of Modica 1 well, Sicily, Italy.

PALEOCENE			EOCENE			OLIGOCENE			MIOCENE			PLIOCENE	PLEISTOCENE
E.	M.	L.	E.	M.	L.	E.	M.	L.	E.	M.	L.		

Single umbilical bulla over aperture is an important feature of *Catapsydrax*.



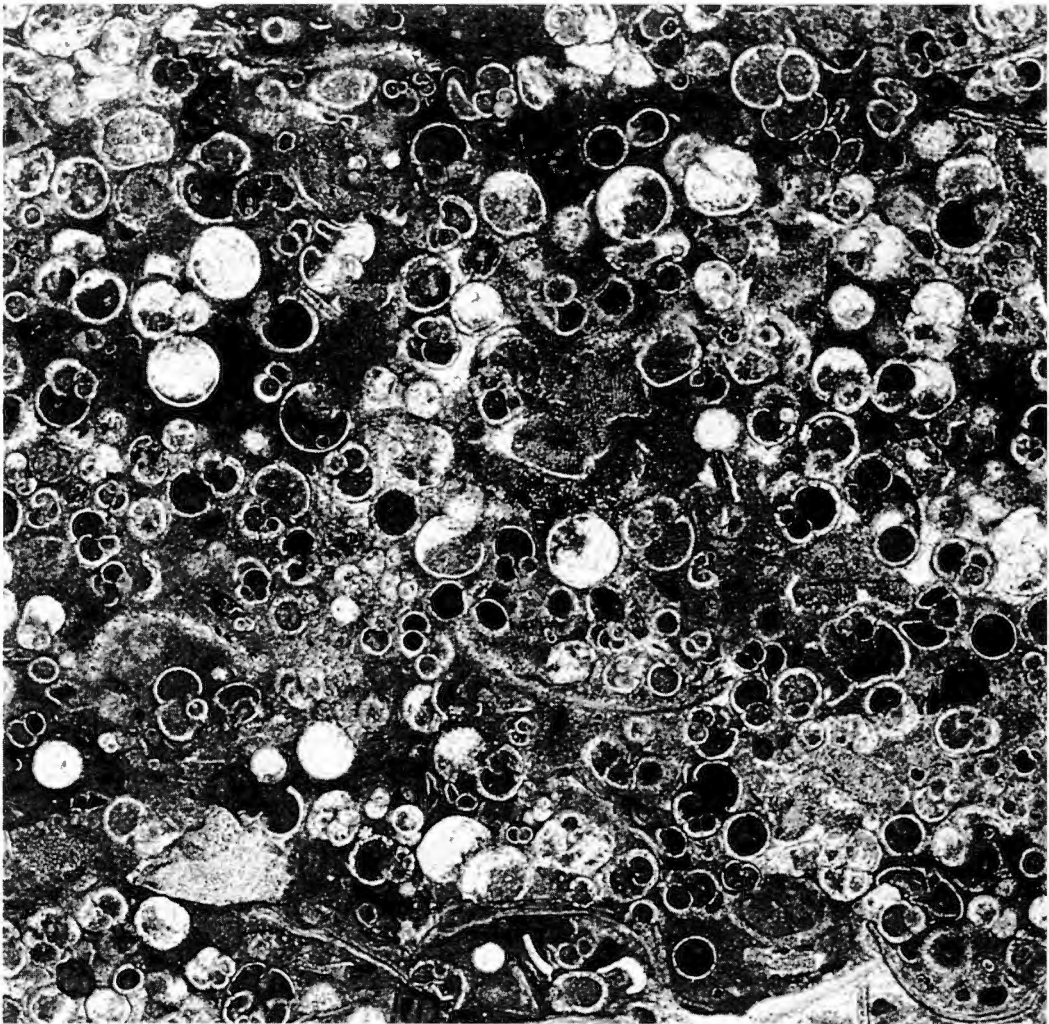
Globoquadrina, *Globigerinidae* and *Nodosariidae* (X 30).
LOWER MIOCENE of Monte dei Fiori,
Abruzzo, Italy.



Globoquadrina (X 110).
LOWER MIOCENE of Monte Conero,
Marche, Italy.

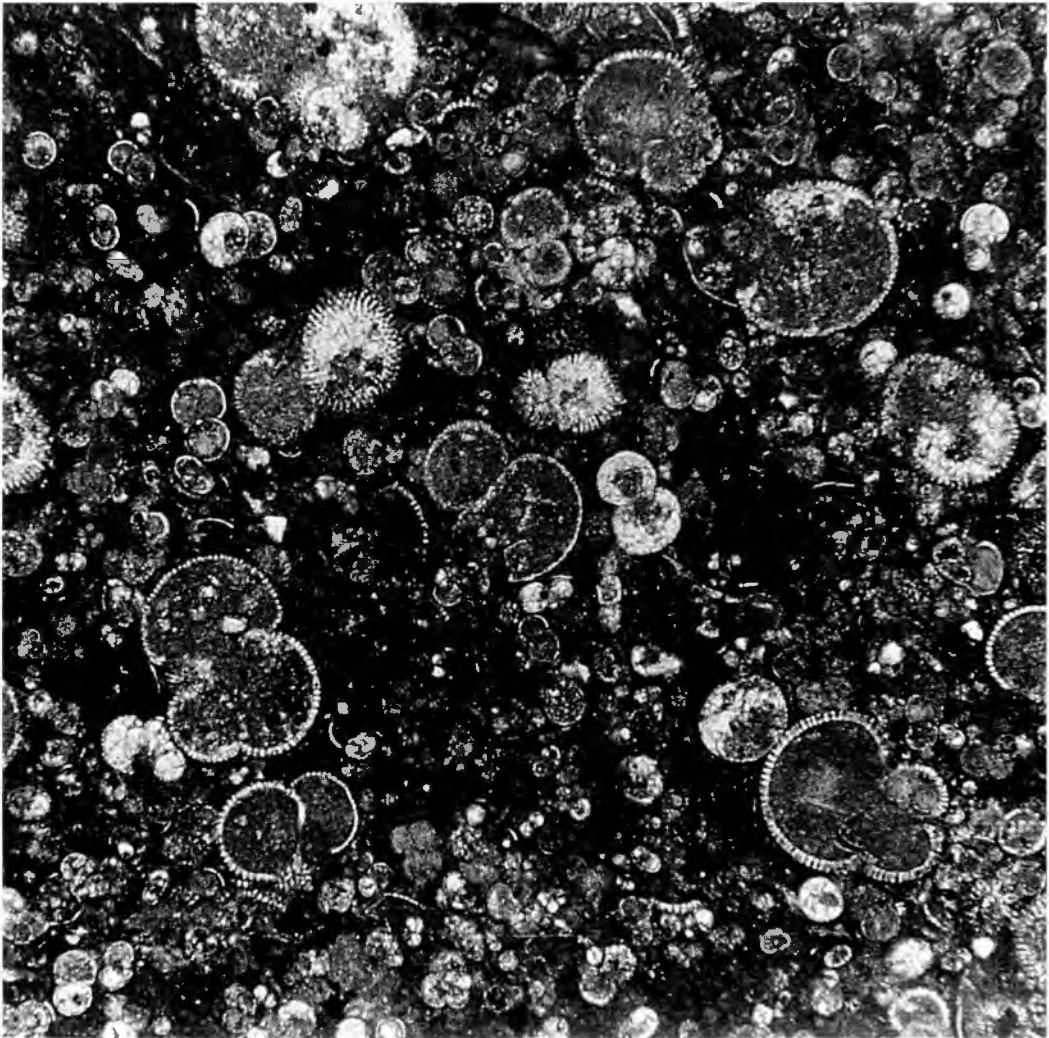
PALEOCENE			EOCENE			OLIGOCENE			MIOCENE			PLIOCENE	PLEISTOCENE
E.	M.	L.	E.	M.	L.	E.	M.	L.	E.	M.	L.		

The identification of this genus is possible thanks to the particular shape of its last chamber.



Globigerinoides, *Praeorbulina* and *Globoquadrina* (X 20).
MIDDLE MIOCENE of Trapani Area, Sicily, Italy.

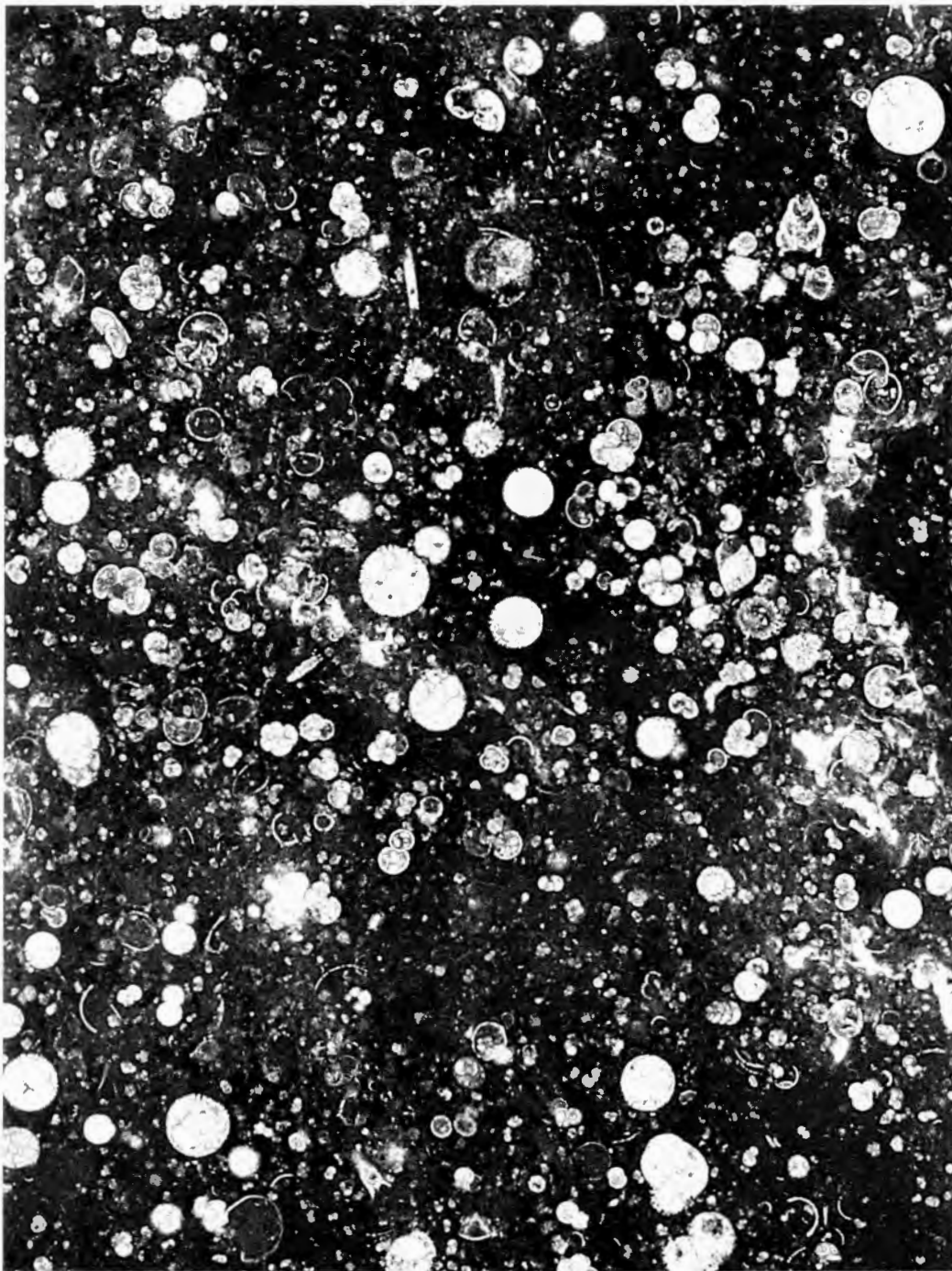
Globigerinoides-*Praeorbulina* assemblages mark the LOWER-MIDDLE MIOCENE boundary.



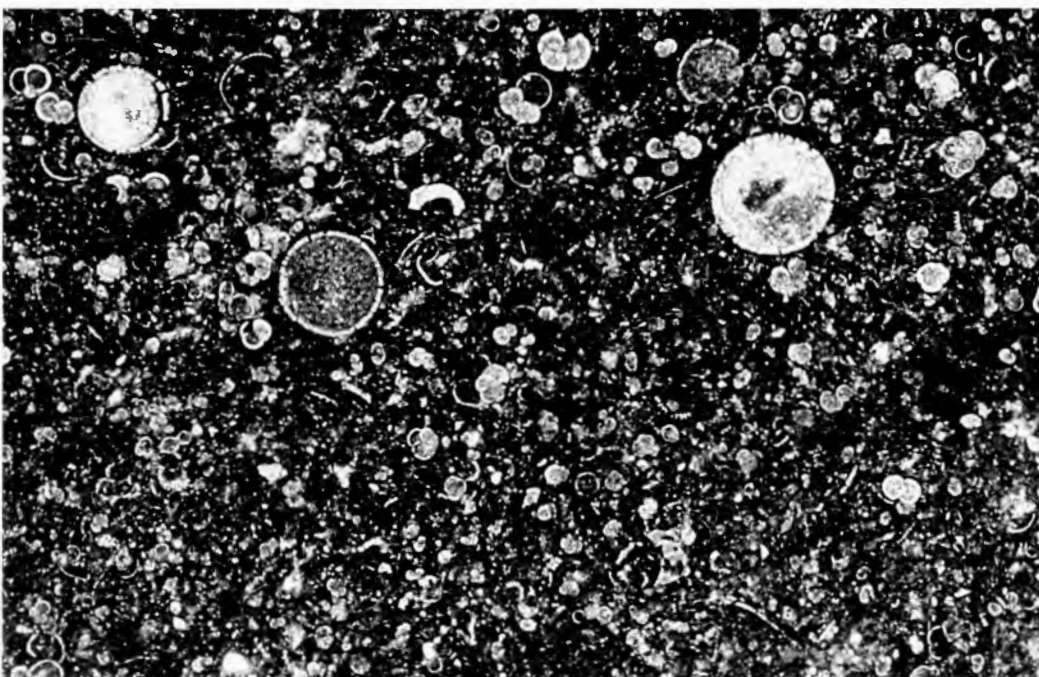
Globigerinoides (X 70).
LOWER MIOCENE of Monte Conero, Marche, Italy.

PALEOCENE			EOCENE			OLIGOCENE			MIOCENE			PLIOCENE	PLEISTOCENE
E.	M.	L.	E.	M.	L.	E.	M.	L.	E.	M.	L.		

This genus shows secondary sutural apertures on spiral sides. *Globigerinoides* are dominant in EARLY MIOCENE assemblages.



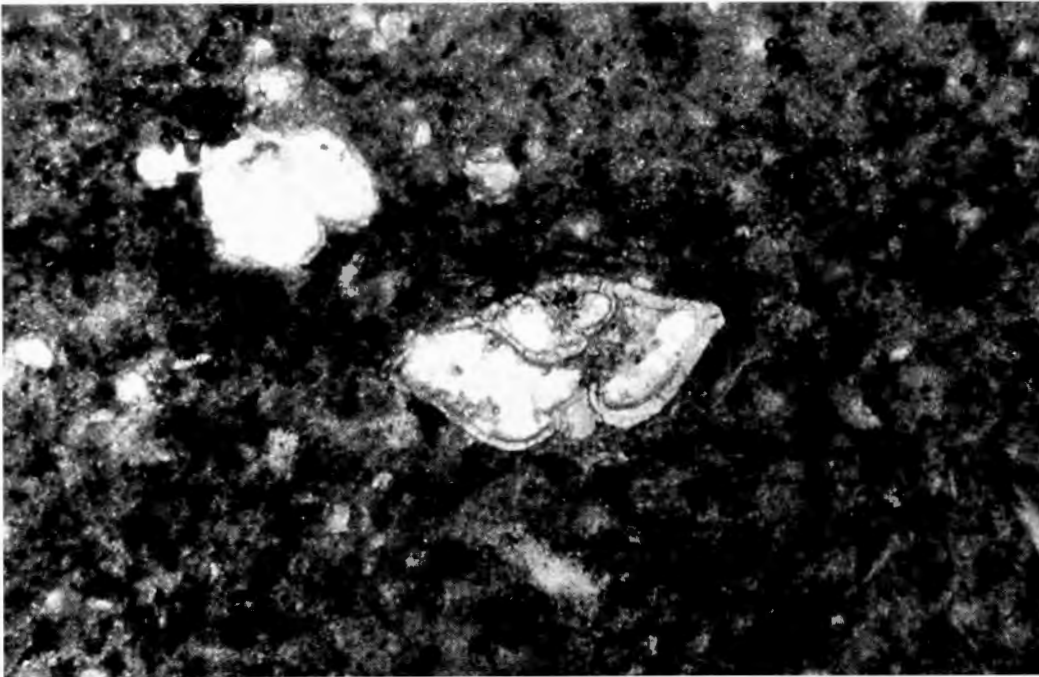
Orbulina, *Globigerinidae*, *Globorotaliidae* and *Nodosariidae* (X 25).
MIDDLE MIOCENE of Vicoli 1 well,
Abruzzo, Italy.



Orbulina (X 30).
MIDDLE MIOCENE of Vicoli 1 well,
Abruzzo, Italy.

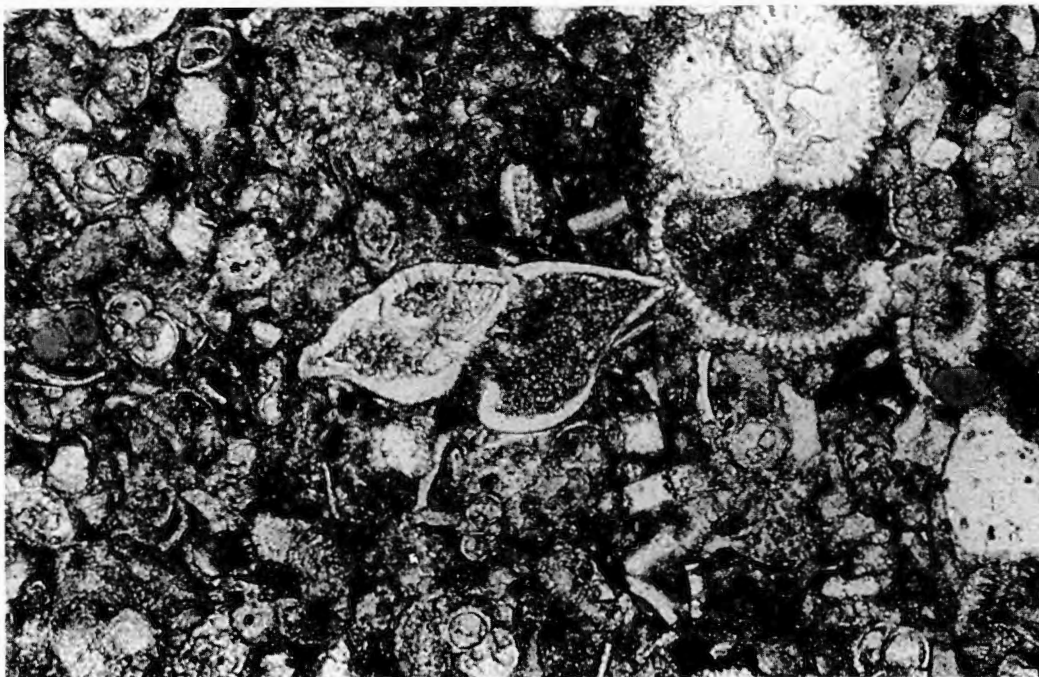
PALEOCENE			EOCENE			OLIGOCENE			MIOCENE			PLIOCENE	PLEISTOCENE
E.	M.	L.	E.	M.	L.	E.	M.	L.	E.	M.	L.		

Orbulina is well identifiable thanks to its spherical shape.

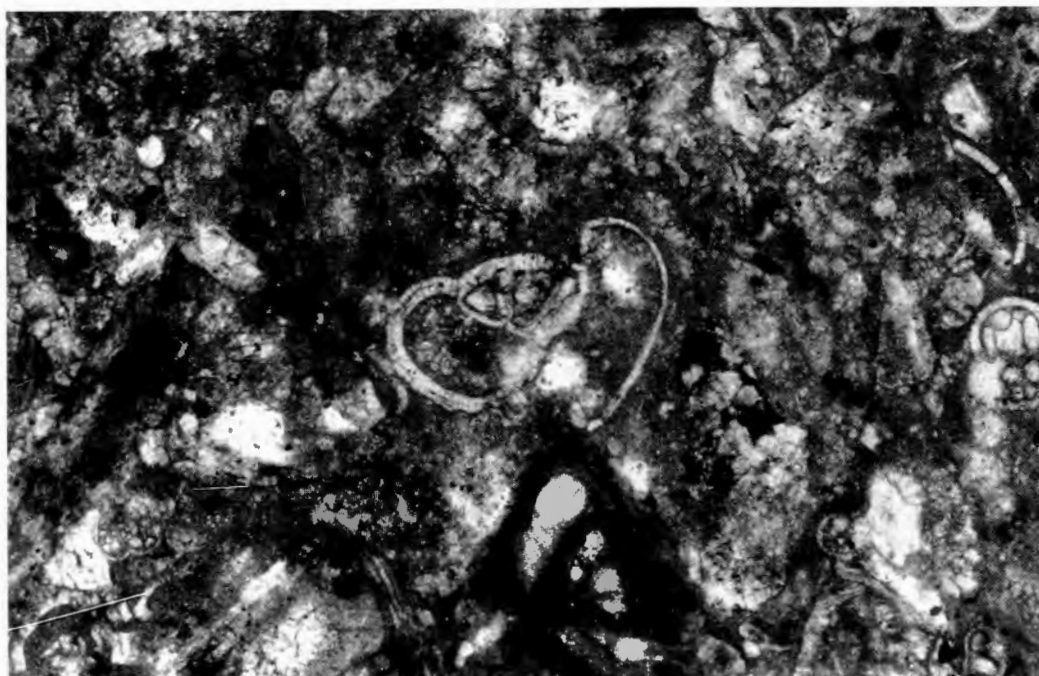


Globorotalia (with acute margin) (X 90).
UPPER MIOCENE of Monte Renna, Sicily, Italy.

Planktonic foraminifers with acute, subacute and keeled peripheral margin occur again during the MIDDLE-LATE MIOCENE.



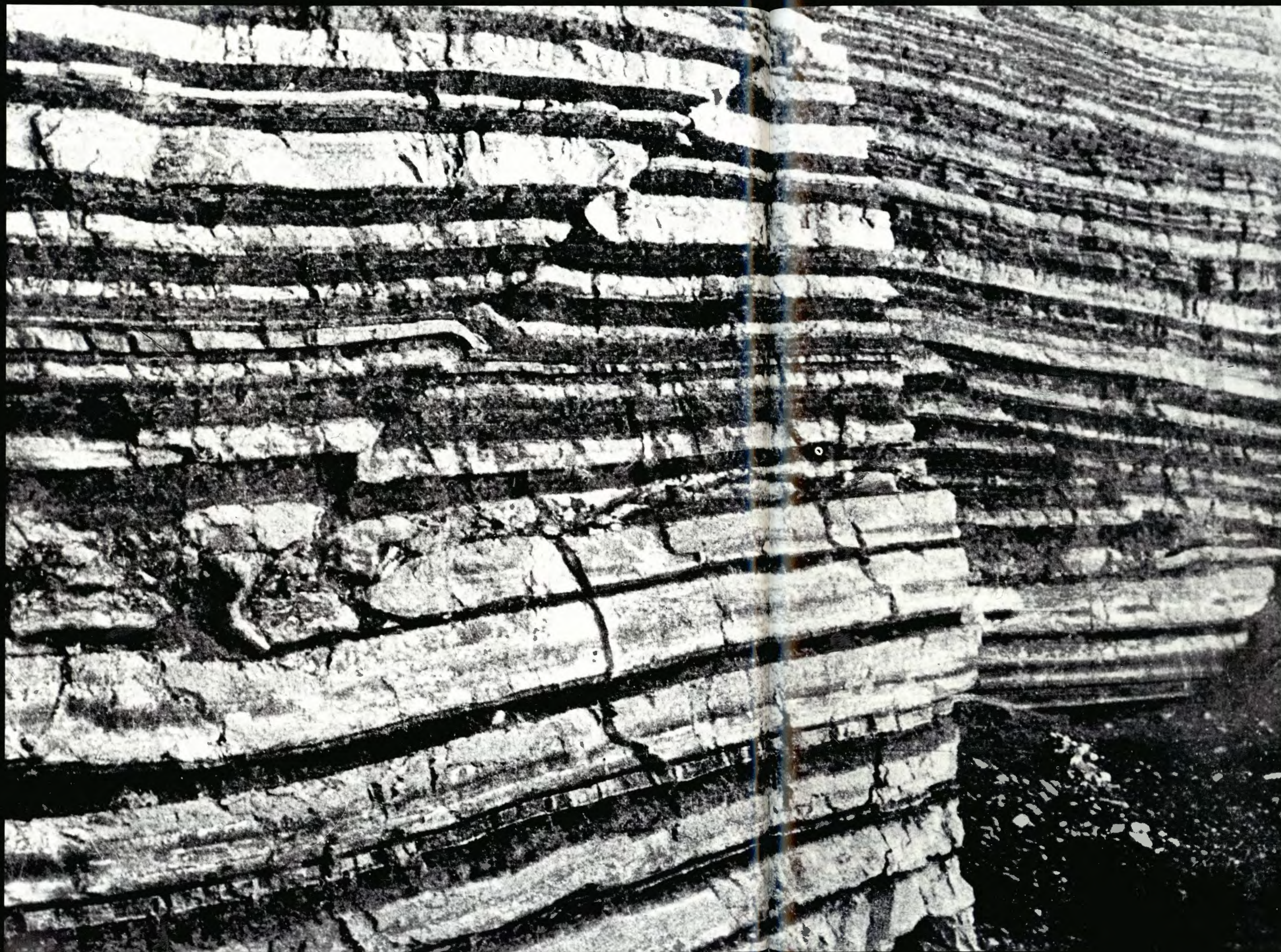
Globorotalia (with acute-keeled margin) (*Globorotalia* gr. *menardii*) (X 110).
UPPER MIOCENE of Madonna della Croce 1 well, Abruzzo, Italy.



Globorotalia puncticulata (DESHAYES) (X 100).
LOWER PLIOCENE of Pomarico 1 well, Basilicata, Italy.

PALEOCENE			EOCENE			OLIGOCENE			MIOCENE			PLIOCENE	PLEISTOCENE
E.	M.	L.	E.	M.	L.	E.	M.	L.	E.	M.	L.		
												■	

Most of the PLIOCENE and QUATERNARY sediments are unconsolidated making the observation of planktonic foraminifers in thin section difficult.



BIOFACIES AND ENVIRONMENTS

Fossils are both good chronostratigraphic markers and useful paleoenvironmental indicators; together with sediment characteristics and sedimentary structures, they can give a complete facies interpretation.

EARLY PERMIAN

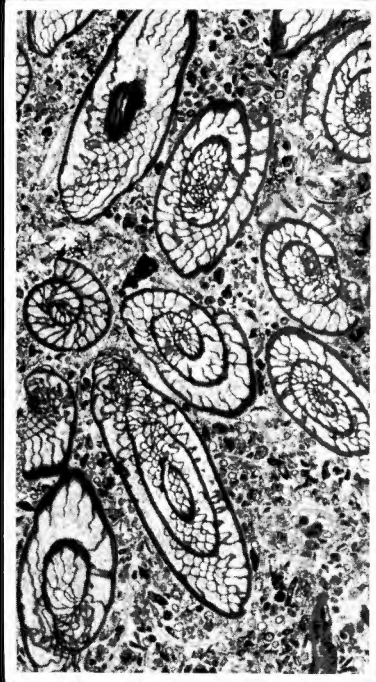
Trilobites and brachiopods



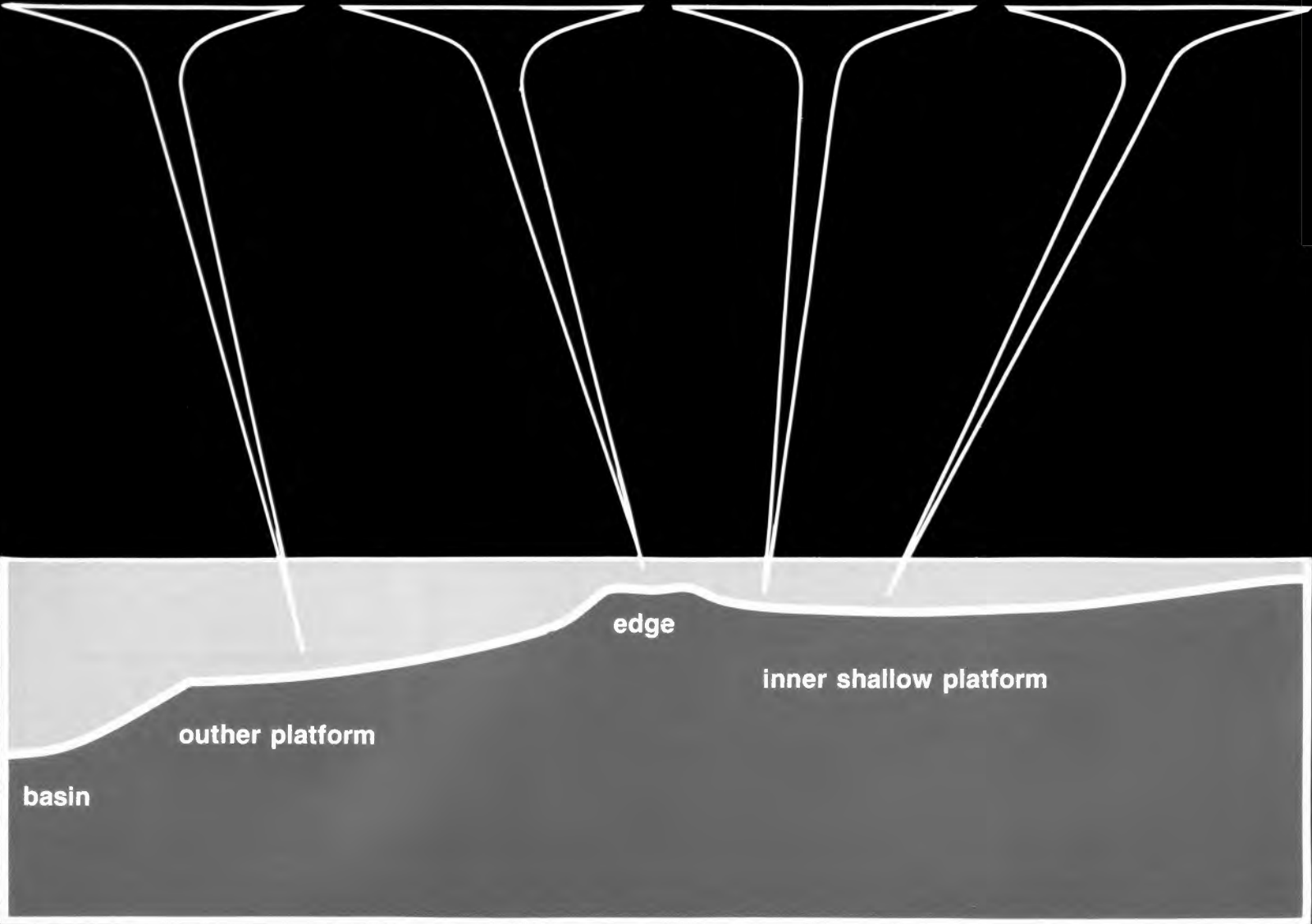
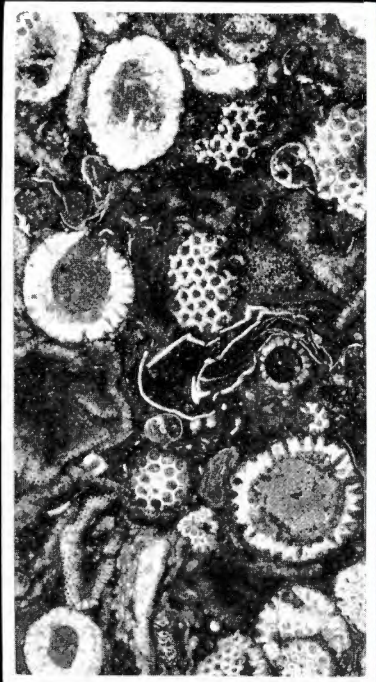
Encrusting algae and Tubiphytes



Fusulinidae

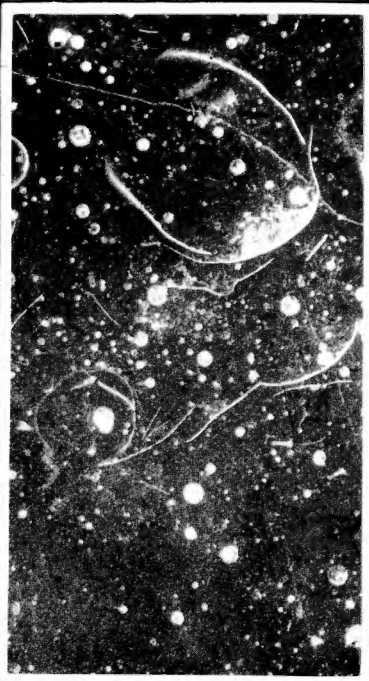


Dasycladales



LATE TRIASSIC

Pelagic pelecypods
and radiolarians



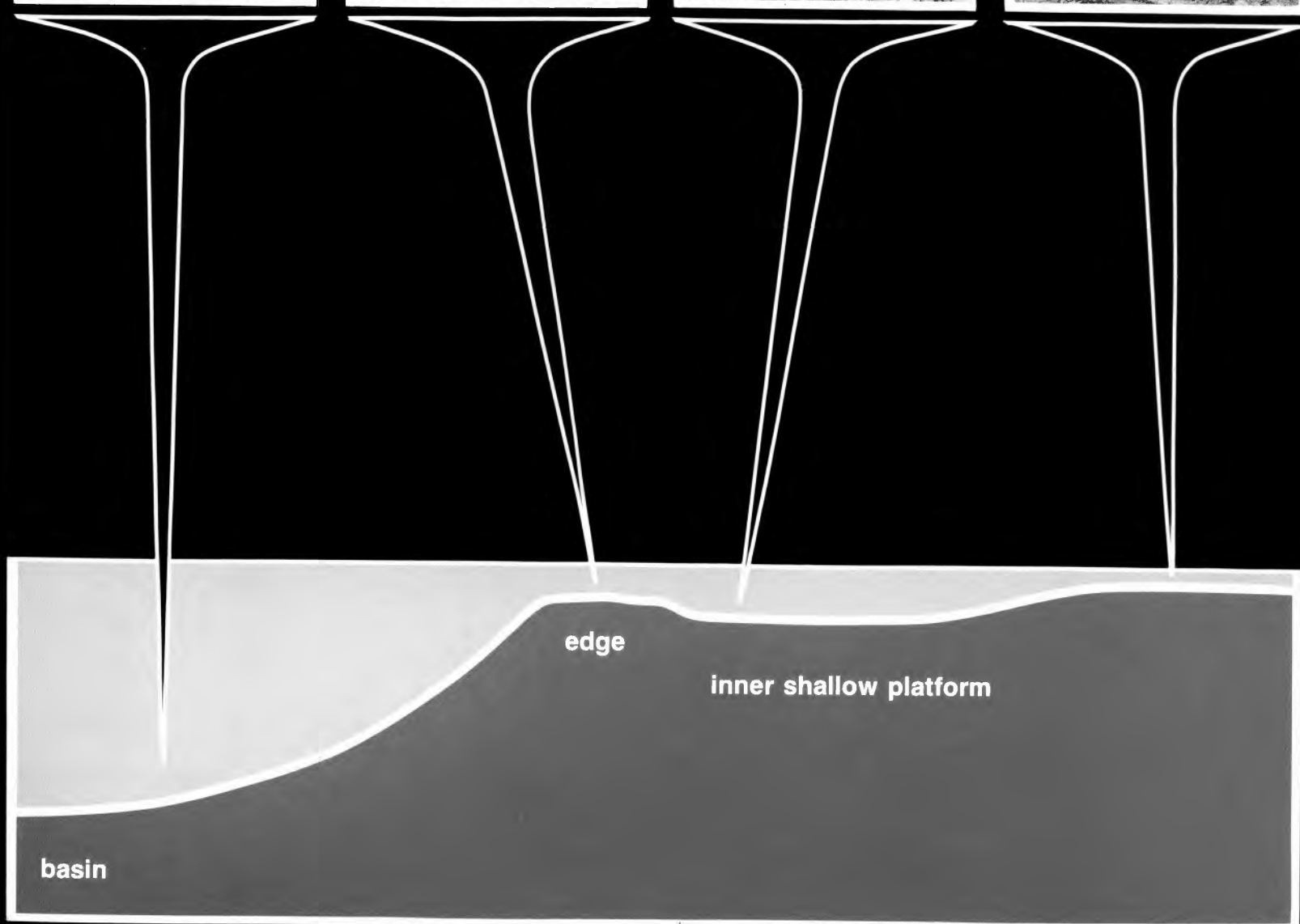
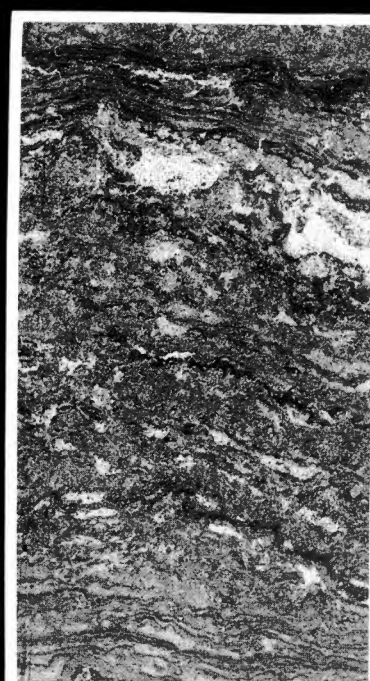
Corals and hydrozoans



Dasycladales

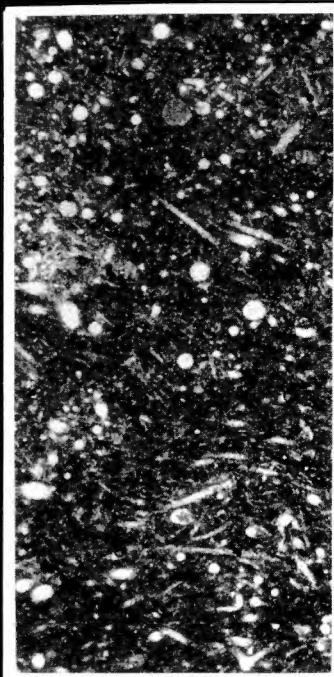


Stromatolites

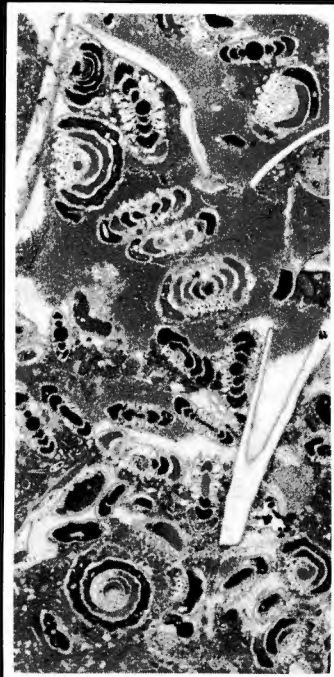


EARLY JURASSIC

Radiolarians
and sponge spicules



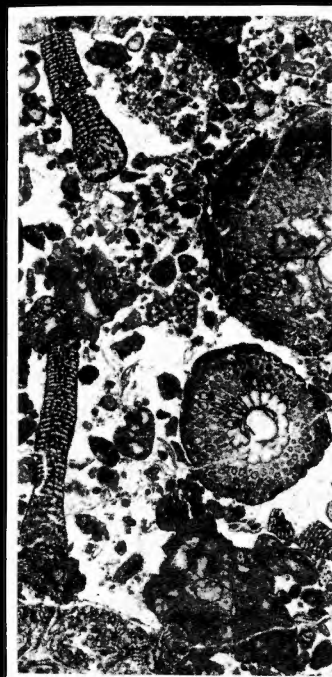
Involutina liassica



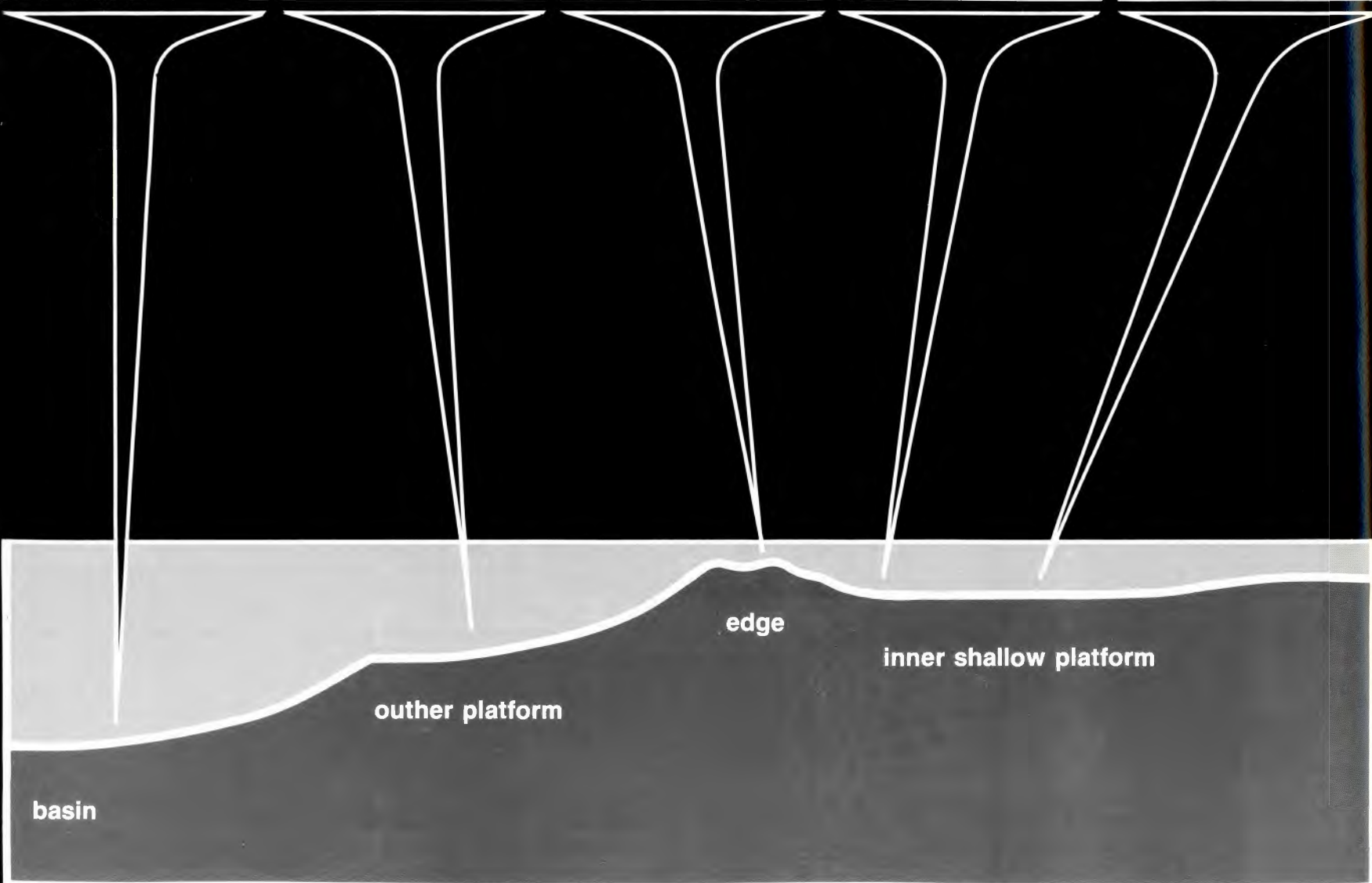
"*Vidalina*" *martana*



Orbitopsella
and *Palaeodasycladus*



Valvulinidae



LATE JURASSIC

Saccocoma



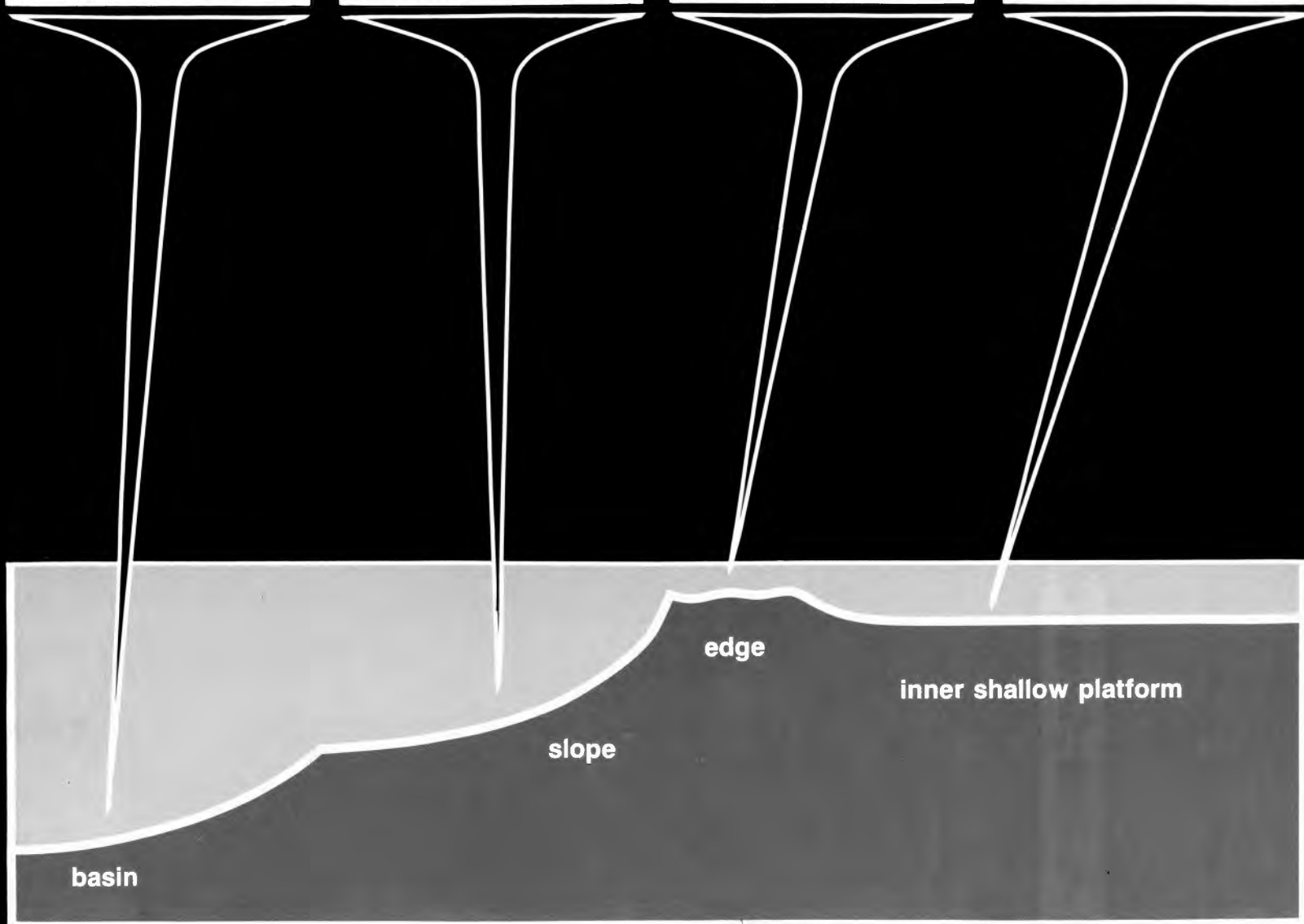
Protopeneroplis striata



Ellipsactinia and corals

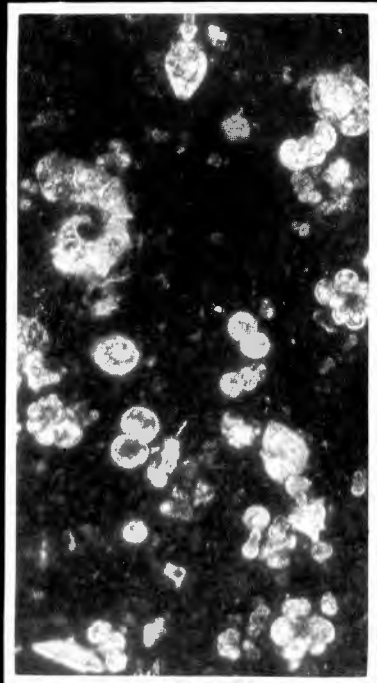


Kurnubia and Clypeina jurassica

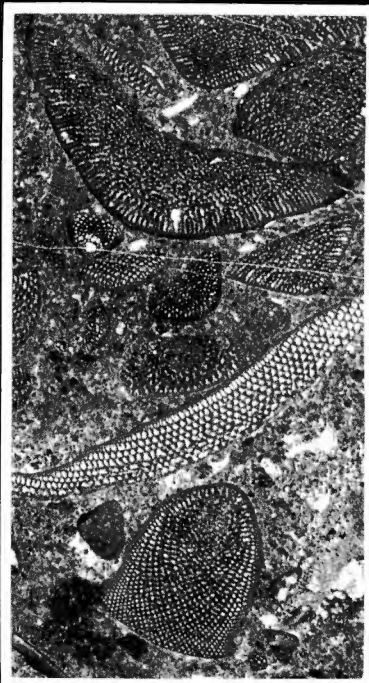


ALBIAN-CENOMANIAN

Planktonic foraminifers



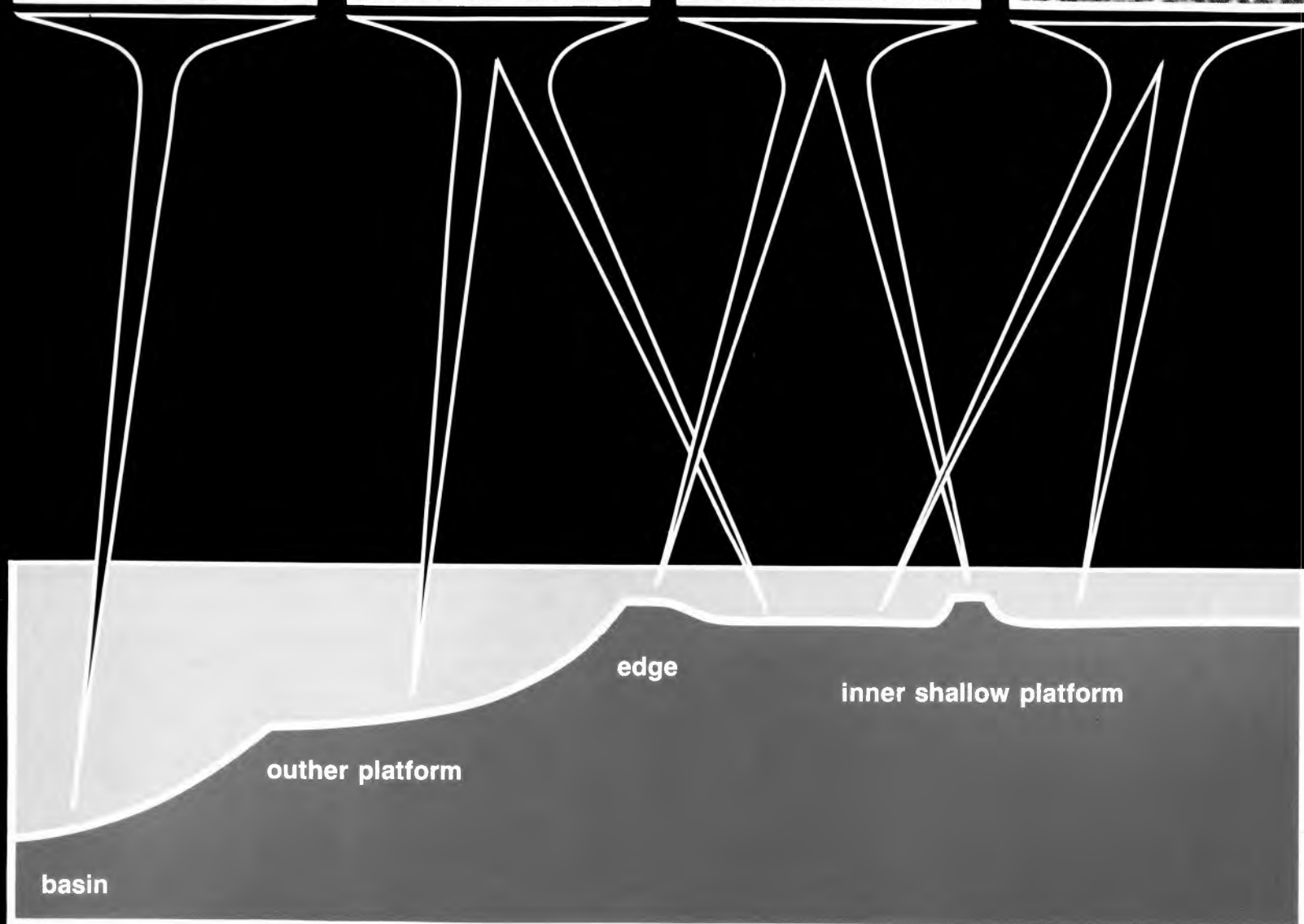
Orbitolina



Rudists

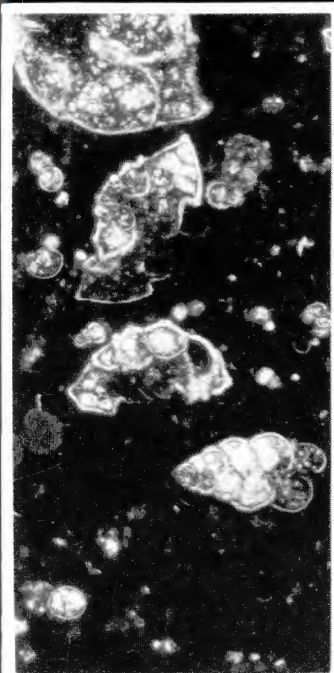


Cuneolina and Miliolidae

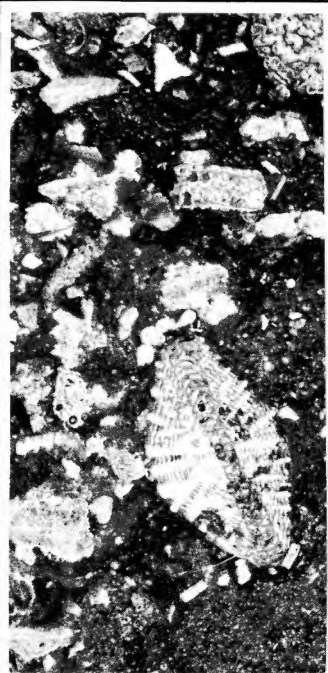


MAASTRICHTIAN

Planktonic foraminifers



Planktonic and benthonic foraminifers



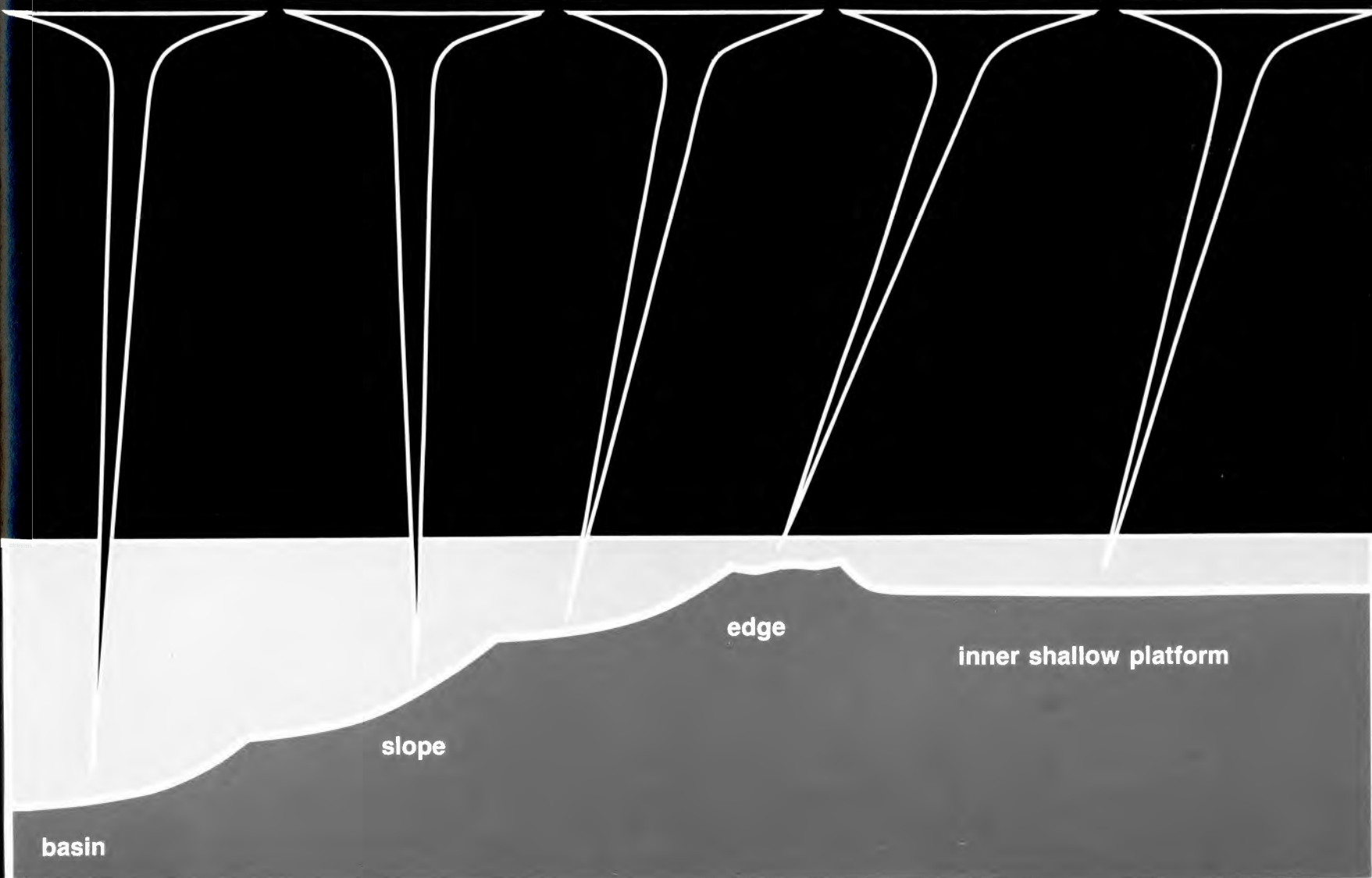
Orbitoididae and Siderolites



Rudists



Miliolidae and Raphydionina



basin

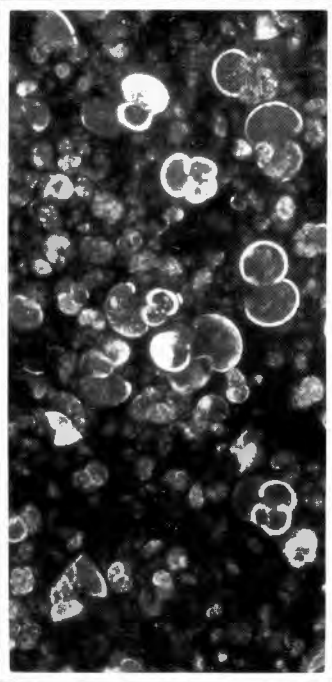
slope

edge

inner shallow platform

EARLY-MIDDLE EOCENE

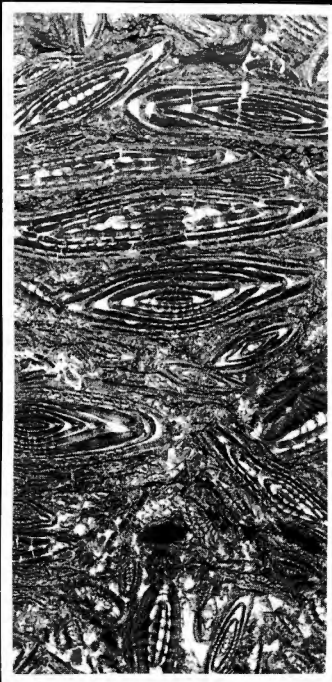
Planktonic foraminifers



Planktonic and benthonic foraminifers



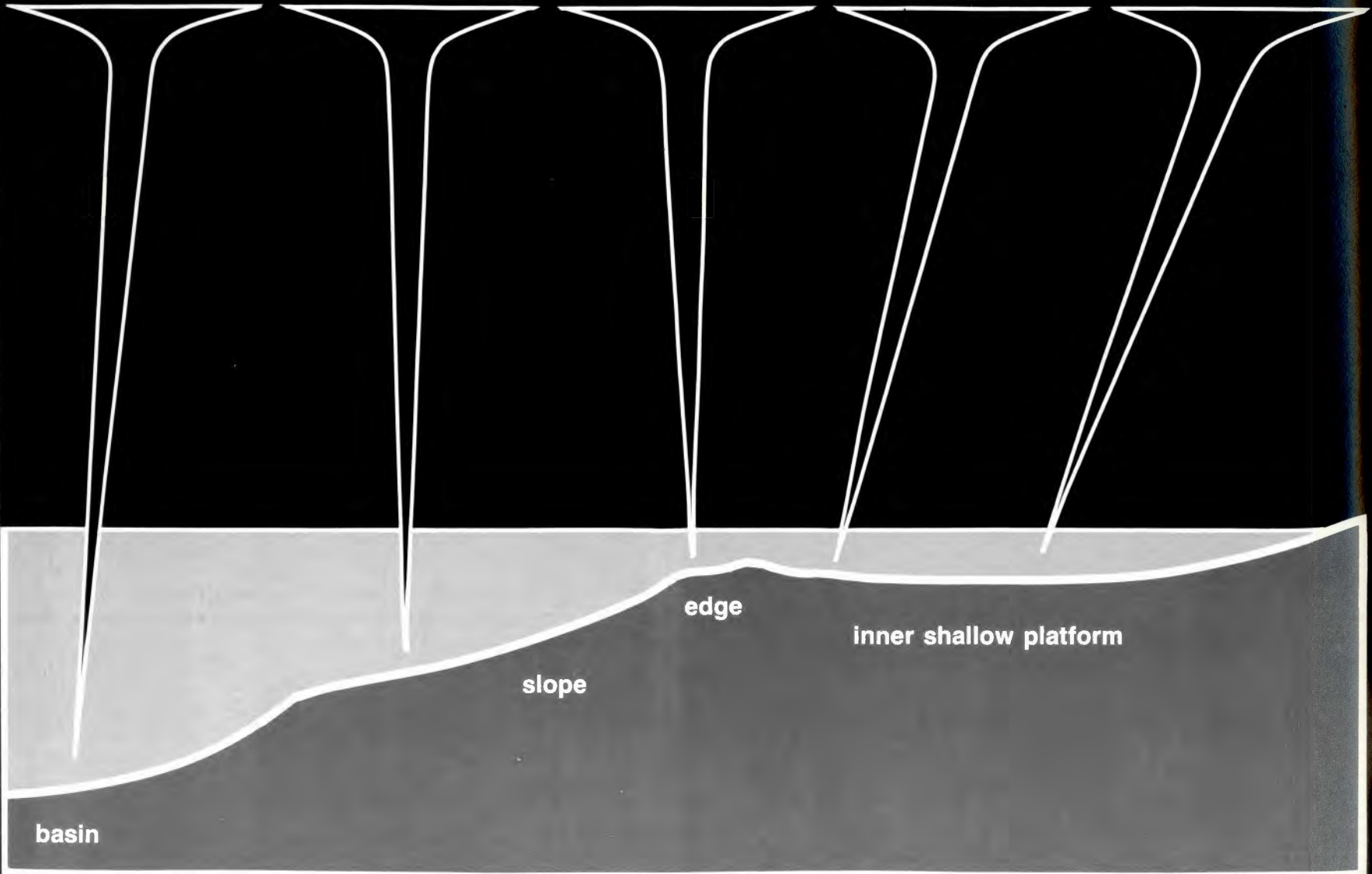
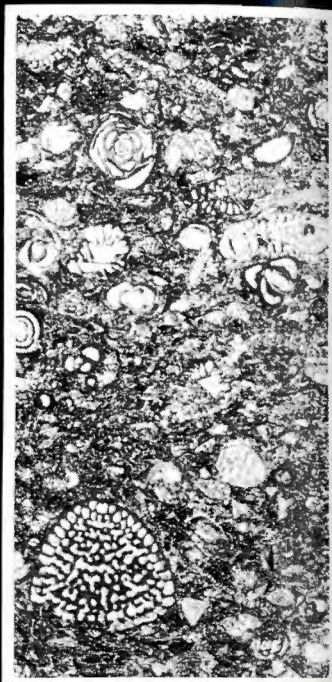
Nummulites



Alveolina

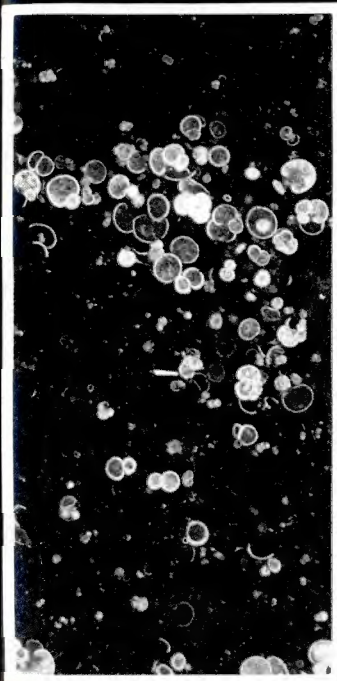


Coskinolina and Miliolidae

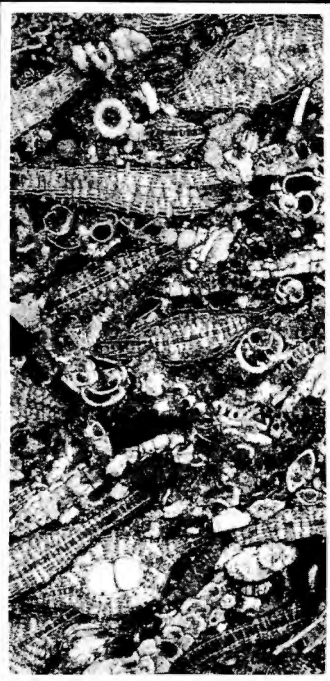


LATE OLIGOCENE

Planktonic foraminifers



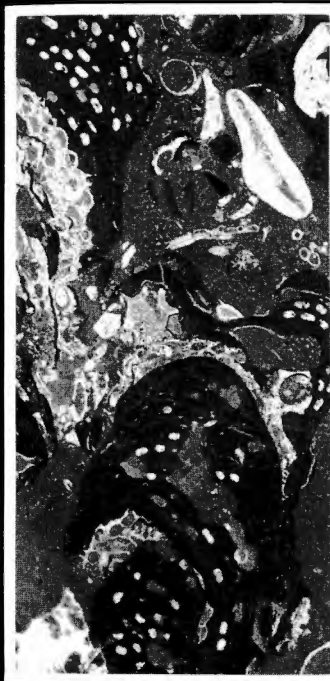
Planktonic and benthonic foraminifers



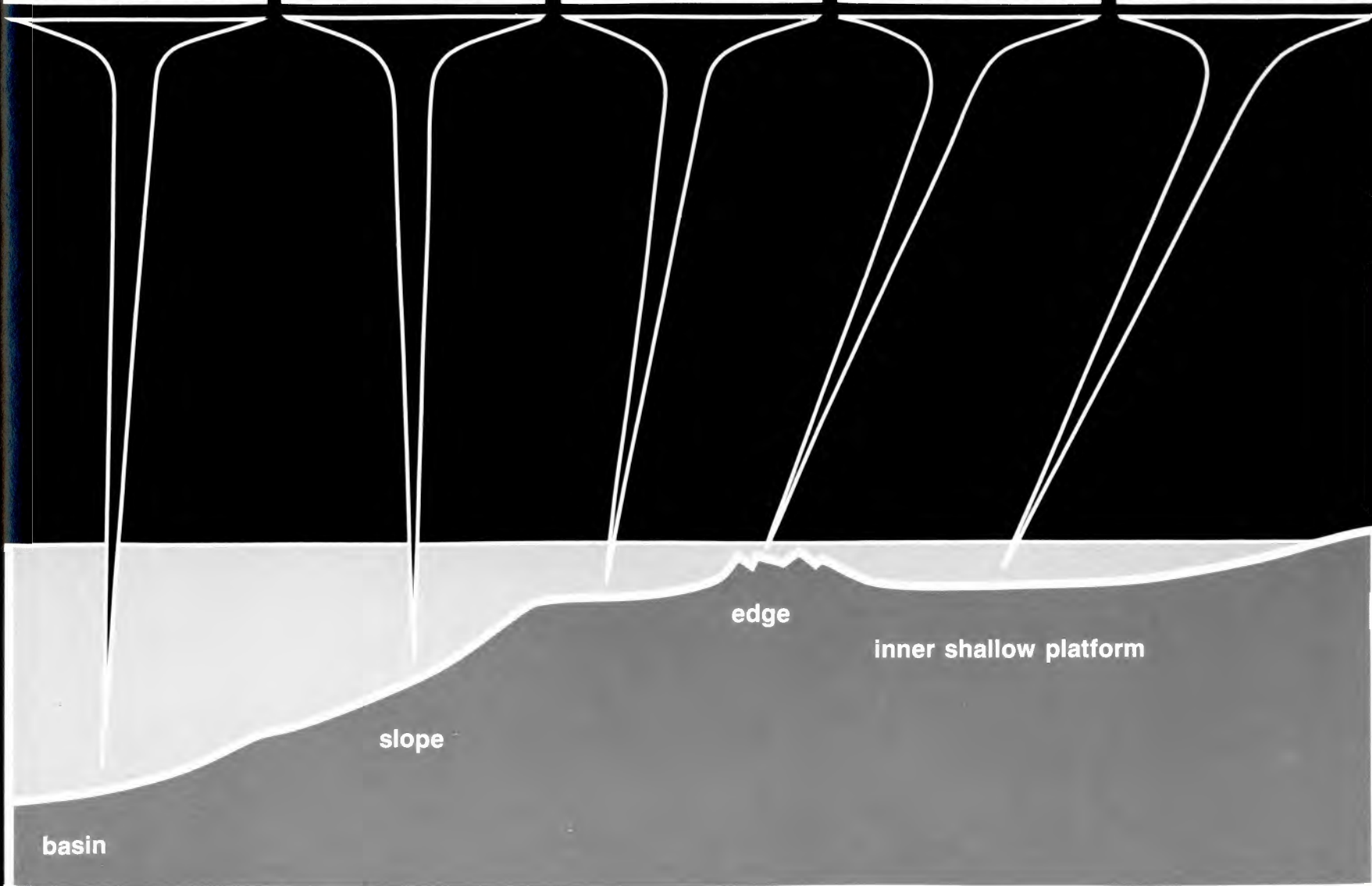
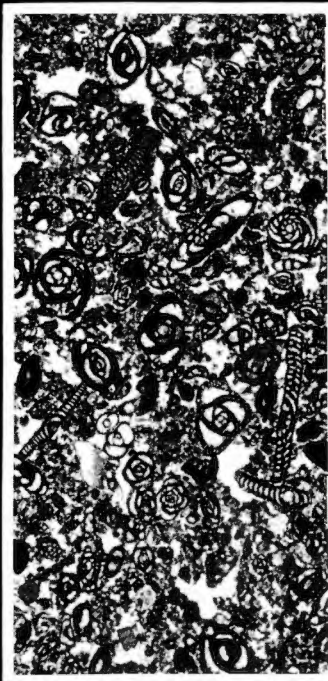
Lepidocyclina and Miogypsinoidea



Melobesidae



Peneroplidae and Miliolidae



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INDEX

- Abathomphalus mayaroensis*, 152
Acarinina bullbrookii, 207
Acarinina topilensis, 206, 207
Accordiella conica, 120
Actinocyclus, 175, 184
Actinoporella podolica, 93
Aeolisaccus, 118
Algae, 32, 35, 92, 125, 156, 162
Alpinoschwagerina stachei, 25
Alveolina, 158, 159, 160, 161, 162, 163, 170, 172, 174, 175, 196, 224
Alveolina (*Glomalveolina*) *gr. primaeva*, 158
Ammonites, 70, 84
Amphistegina, 180, 181, 183, 184, 188, 189, 190, 191, 192, 193
Anchispirocyclus lusitanica, 79
Anellids, 175
Anthraxoporella spectabilis, 36
Aptychus, 84
Archaeodiscus, 19
Archaeocyathids, 16
Archaeolithophyllum, 23, 36
Archaias, 166
Assilina, 172, 177
Asterocyclus, 182, 184
Asterigerina, 175
Atractyloporus lastensis, 39
Auloconus permodiscoides, 48
Aulotortus, 49, 50, 52
Aulotortus friedly, 49, 50
Aulotortus gr. sinuosus, 48
Austrotrillina, 166, 167, 168
- Bacinella irregularis*, 100
Belzungia, 196
Benthonic foraminifers, 223, 224, 225
Biconcava bentori, 111
Bonetocardiella conoidea, 142
Borelis melo, 169
Borelis melo curdica, 169
Bosniella oenensis, 67
Brachiopods, 23, 31, 218
Bradyina, 20, 21
Broeckella belgica, 194
Bryozoans, 31, 33, 187, 191
- Calcisphaerula innominata*, 142
Calcisphaerulidae, 140, 142
Calcitonella, 21, 23, 24
Calpionella alpina, 87, 132
Calpionella elliptica, 132
Calpionellids, 134
Calpionellites darderi, 134
Calpionellopsis oblonga, 134
Calpionellopsis simplex, 133
Campbelliella striata, 82
- Caprinidae, 131
Catapsydrax, 211
Cayeuxia pia, 68
Chapmanina, 186, 187
Choffatella decipiens, 97
Chrysalidina, 160, 164
Chrysalidina gradata, 109, 116
Cisalveolina fraasi, 109, 117
Cladocoropsis mirabilis, 79
Climacammina, 24, 32
Clypeina jurassica, 83, 221
Conicokurnubia, 76
"Conicospirillina" *basiliensis*, 90
Corallinaceae, 197
Corallinae, 197
Corals, 72, 92, 219, 221
Cornuspira, 21
Coskinolina, 160, 224
Coskinolina (Coskinolina) liburnica, 157
Coskinolina (Coskinon) rajkae, 156
Crassicollaria, 87
Cribrobulimina, 164
Cribrigerina, 32, 34
Crinoids, 21, 23, 24, 31
Cuneolina, 102, 123, 222
Cuneolina camposaurii, 94
Cuneolina laurentii, 94
Cuneolina pavonia, 109, 112, 113
- Dasycladales, 218, 219
Daviesina, 170
Debarina hahounerensis, 98
Dendritina, 166, 168, 169
Dicarinella, 141, 147
Dicarinella asymetrica, 146
Dicarinella concavata, 146
Dicarinella imbricata, 141
Dicarinella primitiva, 146
Dictyoconus (Dictyoconus) egyptiensis, 157
Dicylina, 114
Dicyclina schlumbergeri, 114, 115, 121
Diplopora annulata, 55
Diploremina, 44
Discocyclus, 172, 174, 175, 177, 181, 182, 183, 184, 186
Discocyclinidae, 182, 183
Discorinopsis, 164
Distichoplax, 194
Dunbarula mathieu, 28, 34
Duostomina, 44, 45
Duostominidae, 44, 45
- Echinoids, 32, 125, 174, 182, 187
Ellipsactinia, 81, 221
Elphidium, 193
Encrusting algae, 35, 218
- Endothyridae*, 20
Endothyranella, 46
Endothyranella wirzi, 46
Eorupertia, 161, 186
Epimastopora, 25, 32, 33, 37
Eulepidina, 188, 189, 190, 191
Everticyclammina, 67
Everticyclammina hedbergi, 92
- Fabiana, 175, 187
Fallotella (Fallotella) alavensis, 156
Fallotella (Daviesiconus) balsilliei, 157
Favusella washitensis, 140
Fusulinidae, 21, 22, 23, 218
- Galeanella, 51
Gastropods, 34, 42, 81
Geinitzina, 31
Globigerina senni, 206
Globigerinidae, 198, 206, 209, 211, 212, 214
Globigerinatheka, 208
Globigerinelloides, 135, 137
Globigerinoides, 213
Globivalvulina, 19
Globoquadra, 212, 213
Globorotalia, 215
Globorotalia gr. menardii, 215
Globorotalia punctulata, 215
Glorotaliidae, 206, 214
Globotruncana, 147
Globotruncana arca, 148
Globotruncana (Gansserina) gansseri, 152
Globotruncana (Globotruncanita) calcarata, 149
Globotruncana (Globotruncanita) conica, 152
Globotruncana (Globotruncanita) elevata, 148
Globotruncana (Globotruncanita) stuarti, 150
Globotruncana (Globotruncanita) gr. stuarti, 150
Globotruncana (Globotruncanita) gr. stuartiformis, 149
Globotruncana (Rosita) contusa, 153
Globotruncana (Rosita) fornicata, 148
Globotruncana arca, 148
Globotruncana lapparenti, 147
Globotruncana gr. linneiana, 147
Globotruncana tricarinata, 147
Globotruncana ventricosa, 149
Globotruncanidae, 143, 150, 151
Globuligerina, 85, 134
Glomospira, 67
Glomospirella, 50, 52
Graptolites, 17
Griphoporella curvata, 56

- Gymnocodium, 38
 Gymnocodium nodosum, 39
 Gypsina, 181, 187
 Gyroporella, 53
- Hantkenina, 209
 Haurania amiji, 66
 Haurania deserta, 66
 Hedbergella, 135, 136, 137
 Heliolites, 18
 Helvetoglobotruncana helvetica, 143
 Hemicyclammina sigali, 106
 Hemigordiopsis, 34, 35
 Hemigordius, 30, 35
 Heterohelicidae, 150, 151
 Heterohelix, 150, 151
 Heterostegina, 179, 180, 188
 Hippuritidae, 131
 Hormosinidae, 17
 Hydrozoans, 81, 219
- Involutina liassica, 60, 220
- Keramosphaerina tergestina, 120
 Kurnubia, 221
 Kurnubia palastiniensis, 76
- Labyrinthina mirabilis, 78
 Lamelliconus multispirus, 47
 Lamelliconus procerus, 47
 Lepidocyclina, 188, 189, 190, 191, 225
 Lepidorbitoides, 127, 129
 Linderina, 185
 Lithocodium aggregatum, 100
 Lithophyllum, 181, 182, 197
 Lithothamnium, 175, 180, 181, 182, 183, 197
 "Lituosepta" compressa, 65
 Lockhartia, 185
 Loftusia, 124, 128
 Lucasella cayeuxi, 70
- Macroporella retica, 56
 Marginotruncana, 144, 147
 Marginotruncana coronata, 145
 Marginotruncana gr. pseudolinneiana, 145
 Marginotruncana schneegansi, 145
 Marginotruncana gr. sigali, 145
 Mayncina termieri, 64
 Meandrospira dinarica, 43
 Meandrospira pusilla, 43
 Melobesiae, 186, 187, 197, 225
 Mesoendothyra croatica, 71
 Microcodium, 194
 Miliolidae, 102, 109, 112, 113, 118, 121, 123, 124, 130, 156, 159, 160, 161, 162, 163, 165, 166, 167, 168, 184, 195, 196, 222, 223, 224, 225
 Miliolipora cuvillieri, 51
 Miogypsina, 192, 193
 Miogypsinoidea, 188, 190, 191, 225
 Miscellanea, 162, 170, 171
- Mizzia, 34, 35
 Mizzia velebitana, 29, 38
 Montcharmontia, 130
 Montcharmontia apenninica, 119
 Morozovella aequa, 204
 Morozovella angulata, 200
 Morozovella aragonensis, 205
 Morozovella conicotruncata, 200
 Morozovella gracilis, 204
 Morozovella lehneri, 206
 Morozovella spinulosa, 205, 206
 Morozovella gr. subbotinae, 205
 Morozovella trinidadensis, 198
 Morozovella uncinata, 199
 Morozovella velascoensis, 203
 Morozovella gr. velascoensis, 203
 Murgella lata, 112
- Nautiloculina oolithica, 77
 Neoiragia convexa, 104
 Neoiragia insolita, 104
 Neoschwagerina, 26
 Neostaffella, 22
 Neoteutloporella gallaeformis, 72
 Neoteutloporella socialis, 82
 Nephrolepidina, 188, 189, 190, 191
 Nerineids, 81
 Nezzazata, 110
 Nezzazata conica, 110
 Nezzazata simplex, 110
 Nezzazatidae, 110, 111, 118
 Nezzazatinella picardi, 112
 Nodosariidae, 212, 214
 Nummofallotia, 113
 Nummofallotia apula, 111
 Nummuloculina, 112
 Nummulites, 158, 161, 162, 163, 171, 172, 173, 174, 175, 176, 177, 182, 183, 184, 185, 187, 194, 224
- Oligoporella, 53
 Omphalocyclus macroporus, 126, 128
 Operculina, 171, 177, 178, 179, 189, 190
 Opertorbitolites, 163
 Ophthalmidiidae, 109, 156, 161, 165, 195
 Orbitoides, 125, 126, 127, 129
 Orbitoididae, 124, 125, 126, 127, 128, 129, 223
 Orbitolina, 222
 Orbitolina (Conicorbitolina) conica, 105
 Orbitolina (Conicorbitolina) cuvillieri, 105
 Orbitolina (Mesorbitolina) parva, 103
 Orbitolina (Mesorbitolina) texana, 103
 Orbitolina (Orbitolina) gr. concava, 107
 Orbitolina (Orbitolina) sefini, 106
 Orbitolinopsis capuensis, 96
 Orbitolites, 158, 160, 172, 196
 Orbitopsella, 67, 220
 Orbitopsella praecursor, 62, 63
 Orbulina, 214
 Orthoceratids, 16
 Ostracods, 42
 Ovalveolina crassa, 104
 Ovalveolina reicheli, 102
 Ozawainella, 22, 23
- Pachyphloia, 31
 Palaeodasycladus, 220
- Palaeodasycladus mediterraneus, 69
 Paleodictyoconus arabicus, 98
 Paleotextulariidae, 23
 Palorbitolina lenticularis, 99, 100, 135
 Parurgonina caelinensis, 77
 Pelagic pelecypods, 57, 84, 85, 219
 Pelecypods, 42
 Pellatospira, 181, 184
 Peneroplidae, 166, 167, 225
 Permocalculus, 29, 35, 38
 Pfenderella arabica, 74
 Pfenderina salernitana, 74, 75
 Pfenderina trochoidea, 75
 Physoporella, 53
 Pilamina densa, 43
 Pithonella ovalis, 142
 Planomalina buxtorfi, 137
 Planktonic foraminifers, 182, 184, 186, 188, 222, 223, 224, 225
 Planorotalites compressa, 199
 Planorotalites ehrenbergi, 200
 Planorotalites pseudomenardii, 202, 203
 Planorotalites pusilla pusilla, 201
 Poikiloporella duplicata, 56
 Polydiexodina, 27
 Praealveolina gr. cretacea, 108
 Praealveolina simplex, 108
 Praechrysalidina infracretacea, 102
 Praeglobotruncana, 143
 Praeglobotruncana gibba, 140
 Praekurnubia crusei, 76
 Praeorbitolina cormyi, 99
 Praeorbitolina wienandsi, 99
 Praeorbulina, 213
 Praerhapidionina, 165
 Pratulionella salernitana, 195
 "Protoglobigerina", 85
 Protopenneroplis striata, 73, 221
 Protopenneroplis trochangulata, 91
 Pseudedomia, 127
 Pseudocyclammina liassica, 65, 67
 Pseudocyclammina lituus, 92
 Pseudolituonella reicheli, 117
 Pseudonummoloculina, 112
 Pseudorhapydionina dubia, 112, 118
 Pseudorhapydionina laurinsensis, 118
 Pseudotextulariella salevensis, 94
 Pseudotextulariella? scarsellai, 95, 102
- Quasifusulina, 23
- Raadshoovenia salentina, 123
 Radiolarians, 57, 84, 85, 219, 220
 Radiolitidae, 131
 Ranikothalia, 162, 171
 Rectocornuspira kalhori, 42
 Remaniella cadischiana, 133
 Rhapydionina, 165, 223
 Rhapydionina liburnica, 130
 Rotalia skourensis, 124
 Rotaliidae, 124, 127, 172, 175, 183, 186, 187, 196
 Rotalipora, 138
 Rotalipora appenninica, 138, 139
 Rotalipora greenhornensis, 139
 Rotalipora reicheli, 139
 Rotalipora ticinensis, 138
 Rudists, 125, 126, 131, 222, 223

Sabaudia capitata, 95
Sabaudia minuta, 95
Saccocoma, 86, 221
Sakesaria, 171, 185
Salpingoporella annulata, 80
Salpingoporella dinarica, 101, 102
Salpingoporella sellii, 80
Satorina apuliensis, 75
Saudia labyrinthica, 162, 171
Scandonea samnitica, 120, 121
Schackoina, 141
Schwagerinidae, 24, 25, 27, 32, 34, 37
Sellialveolina viallii, 109
Selliporella donzellii, 72
Sichotenella, 30
Siderolites, 223
Siderolites calcitrapoides, 125, 127, 129
"Siphovalvulina", 67
"Small globigerinids", 198
Somalina, 162
Sphaerogypsina 175, 191
Spiroclypeus, 180, 181, 191
Spiroconulus perconigi, 70
Spirolina, 161, 167, 195
Sponge spicules, 220
"Stomiosphaera" sphaerica, 142

Stromatolites, 219
Styliolina, 18
"Subbotina" pseudobulloides, 198, 199
Subterraniophyllum thomasi, 197

Tentaculites, 17
Tetracorals, 18
Tetrataxis, 33
Teutloporella nodosa, 54
Textulariidae, 67, 92, 102, 109, 112, 113, 118, 121
Thaumatoporella parvovesiculifera, 67, 68
Ticinella, 136, 137
Tintinnopsella carpathica, 132
Tintinnopsella longa, 133
Triadodiscus eomesozoicus, 47
Triasina hantkeni, 50, 52
Trilobites, 17, 218
Triploporella marsicana, 100
Triploporella? neocomiensis, 93
Triploporella praturloni, 96
Trocholina, 91, 92
Trochospira avnimelechi, 111
Tuberitina, 19, 23

Tubiphytes, 25, 37, 218
Turborotalia cerroazulensis cerroazulensis, 210
Turborotalia cerroazulensis cocoaensis, 210
Turborotalia cerroazulensis cunialensis, 210
Turrioglomina mesotriasica, 46

Valvulina lugeoni, 74
Valvulinidae, 67, 74, 75, 113, 220
Valvulininae, 159, 164, 165, 195
Variostoma, 44, 45
Verbeekinidae, 26, 29
Vercorsella arenata, 95
Victoriella, 186, 187
"Vidalina" martana, 61, 220

Wedekindellina, 23
Whiteinella, 143

Yabeina syrtalis, 29, 34

Recto:

Nummulites from the Middle Eocene of Pachino,
Sicily (X 15).

Verso:

Dunbarula mathieui CIRY from the Upper Permian
of Jebel Tebaga, Tunisia (X 20).

