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FORAMINIFERAL AND ALGAL BIOSTRATIGRAPHY AND PETROLOGY OF THE TRIASSIC TO EARLY CRETACEOUS CARBONATE ASSEMBLAGES IN THE KARABURUN PENINSULA (WESTERN TURKEY)

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ABSTRACT

The Mesozoic carbonate assemblage of the central region of the Karaburun Peninsula is stratigraphically and paleontologically investigated.

The Mesozoic carbonate assemblage rests on the basement rocks which bound each other along problematical contacts. The contact of the Mesozoic assemblage and the Carboniferous (Bashkirian) Limestone unit seems to be an unconformity. The contact between the Mesozoic assemblage and the Blocky-turbiditic clastic unit, on the other hand, is a displacement plane.

The Mesozoic carbonate assemblage consists of, from base to top, pre-Middle Anisian and/or Middle Anisian Gerence Formation, Middle Anisian to Norian Camiboğazı Formation, Norian Güvercinlik Formation, Rhatian to Middle Liassic Nohutalan Formation, Kimmeridgian Birgi Formation and Albian and/or post-Albian Aktepe Formation. The Camiboğazı Formation is divided into Middle Anisian to Ladinian Laleköy, Ladinian to Carnian Saplazdağı and Carnian to Norian Hanaylı Members. The Nohutalan Formation is divided informally into Rhaetian to Early Liassic Lower limestone an Early to Middle Liassic Upper limestone subunits. The Aktepe Formation is divided informally into Albian Limestone and Albian and/or post-Albian Limestone-conglomerate subunits.

The Mesozoic sequence is interrupted by two bauxite-bearing unconformity surfaces which correspond to the Middle Liassic to Kimmeridgian and Kimmeridgian to Albian time intervals, respectively.

The pre-Middle and/or Middle Anisian lowermost part of the Mesozoic carbonate rocks reflect deep sea to fore slope conditions. The uppermost part of Middle Anisian

rocks indicate carbonate platform and carbonate build up environments. The Middle Anisian to Norian limestones precipitated mainly in the fore-slope, subtidal, open shelf to lagoonal platform and subtidal to intertidal environments, respectively. The Middle Norian formations display sporadic beach conditions and shallow restricted shelf conditions. The Rhaetian to Liassic part of the sequence precipitated in restricted circulation shallow platform conditions with subtidal to intertidal intercalations. The sequence is interrupted by a bauxite-bearing unconformity which is thought to be formed in a lowland coastal environment at the end of Middle Liassic. The Upper Jurassic part of the sequence precipitated in an open shelf platform environment and is interrupted by a second bauxite-bearing unconformity surface which corresponds to a lowland coastal environment. Uppermost part of the sequence precipitated in open to restricted shelf environment evolving to fore-slope and shallow water marine conditions, respectively.

In the study 105 Triassic, 25 Jurassic and 28 Cretaceous foraminiferal taxa, and 21 Triassic, 3 Jurassic and 9 Cretaceous algal taxa are determined. Foraminiferal and algal determinations revealed detailed ages for the sequence.

In the Triassic formations from base to top, *Meandrospira dinarica* concurrent range zone for Middle Anisian (Pelsonian), *Turriglomina mesotriassia* range zone for the Pelsonian-Cordevalian time interval, *Triadodiscus eomesozoicus* partial range zone for Ladinian-Carnian, *Aulotortus communis* interval zone for the Early Norian, *Triasina oberhauseri* range zone for the Middle Norian, *Triasina hantkeni range zone* for the Middle-Late Rhaetian time interval are described. In Lower Jurassic formations, *Orbitopsella praecursor* range-zone for Late Pliensbaschian is suggested.

Lower Liassic to Albian rocks contain algal flora indicating a southern Tethyan origin.

The Mesozoic sequence are compressed, folded and faulted in the study area. The earliest age of this deformation is thougth to be post-Albian.

ÖZET

Bu çalışmada Karaburun Yarımadası (İzmir) Orta Kesimi'nin stratigrafik ve paleontolojik özellikleri incelenmiştir.

Alanda Mezozoyik yaşlı karbonat istifi birbirleriyle problemli dokanak ilişkileri sunan temel kayalarını üzerler. Mesozoyik topluluk ile altlayan Karbonifer (Başkiriyen) yaşlı Kireçtaşı-dolomit birimi'nin dokanağı bir uyumsuzluk gibi görünür. Bununla birlikte, Mezozoyik istifin Bloklu-türbiditik kırıntılı birimi üstlediği alanlarda, dokanak, bir "yerdeğiştirme dokanağı" özellikleri sunar.

Mezozoyik karbonat istifi, altta Orta Anisiyen öncesi ve/veya Orta Anisiyen yaşlı Gerence Formasyonu ile başlar ve üste doğru Orta Anisiyen-Noriyen yaşlı Camiboğazı Formasyonu, Noriyen yaşlı Güvercinlik Formasyonu, Resiyen-Orta Lias yaşlı Nohutalan Formasyonu, Kimmerisiyen yaşlı Birgi Formasyonu ve Albiyen ve/veya Albiyen-Albiyen sonrası yaşlı Aktepe Formasyonu ile devam eder. Camiboğazı Formasyonu içinde Orta Anisiyen-Ladiniyen yaşlı Laleköy, Ladiniyen-Karniyen yaşlı Saplazdağı ve Karniyen-Noriyen yaşlı Hanaylı üyeleri ayırtlanır. Nohutalan Formasyonu içinde Resiyen-Erken Liyas yaşlı Alt kireçtaşı ve Erken-Orta Liyas yaşlı Üst kireçtaşı astbirimleri ayırtlanır. Aktepe Formasyonu, Albiyen yaşlı Kireçtaşı ve Albiyen ve/veya Albiyen sonrası yaşlı Kireçtaşı-çakıltaş astbirimlerine ayrılır.

Mezozoyik istifi boksit düzeyleri içeren iki farklı uyumsuzluk düzlemi tarafından kesilir. Bu uyumsuzluklar alttan üste doğru Orta Lias-Kimmerisiyen ve Kimmerisiyen-Albiyen yaş aralıklarına karşılık gelir.

İstifin Orta Anisiyen öncesi ve/veya Orta Anisiyen yaşlı en alt kesimi derin deniz-yokuş önü koşullarını yansıtır. Orta Ansiyen yaşlı bölümün en üst kesimleri karbonat platform ortamında çökelmiştir. Orta Anisiyen-Noriyen yaşlı kireçtaşlarının değişik bölümleri, alttan üste, yokuş önü, gelgit altı, sığdeniz-lagünel platform ve gelgit altı-gelgit arası fasiyeslerde çökelmiştir. Orta Noriyen kayaları ender plaj kumu içeren sınırlı dolaşımlı sığ deniz koşullarını yansıtır. Resiyen-Liyas yaşlı kesim gelgit altı-gelgit arası koşulları ile ardalanan sınırlı dolaşımlı sığ platform koşullarında çökelmiştir. Bu istif Orta Liyas'ın sonunda, olasılıkla kıyı düzlüğü koşullarında oluşmuş boksit düzeyleri içeren, bir uyumsuzluk düzlemi ile kesilir. Karbonat istifinin Üst Jura kesimi, dolaşımlı sığdeniz platform ortamında oluşmuştur ve olasılıkla kıyı düzlüğü koşullarında oluşmuş boksitler içeren, ikinci bir uyumsuzluk yüzeyi ile kesilir. Mezozoyik karbonat istifinin en üst kesimi ise alttan üste, sırasıyla, sınırlı dolaşımlı sığ deniz, yokuş önü ve sığ deniz ortamlarında çökelmiştir.

Bu çalışmada 105 Triyas, 25 Jura ve 28 Kretase foraminifer taksonu ve 21 Triyas, 3 Jura ve 9 Kretase algal taksonu tanımlanmıştır. İstifin foraminifer ve alg içeriği ayrıntılı yaş verilmesine olanak tanır.

Triyas yaşlı birimleri içinde alttan üste doğru Orta Anisiyen (Pelsoniyen) için *Meandrospira dinarica* aşmalı menzil zonu, Pelsoniyen-Kordevaliyen aralığı için *Turriglomina mesotriassia* menzil zonu, Ladiniyen-Karniyen için *Triadodiscus eomesozoicus* kısmi menzil zonu, Erken Noriyen için *Aulotortus communis* aralık zonu, Orta Noriyen için *Triasina oberhauseri* menzil zonu, Orta-Geç Resiyen aralığı için *Triasina hantkeni* menzil zonu tanımlanmıştır. Alt Jura birimlerinde Geç Pliensbaschian için *Orbitopsella praecursor* menzil zonu önerilmiştir.

Alt Lias-Albiyen kayalarının algal içerikleri Güney Tetis kökenli bir florayı simgeler.

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CONTENTS

Page

Acknowledgement..... iii
Abstract..... iv
Özet..... vi
List of tables..... xx
List of figures..... xxi

Chapter One
INTRODUCTION

1. 1. Study area.....1
1. 2. Purpose and medhods..... 3
1. 3. Previous studies..... 6
1. 3. 1. Previous studies on stratigraphy..... 6
1. 3. 2. Previous studies on paleontology.....9

Chapter Two
STRATIGRAPHY

2. 1. BASEMENT UNITS..... 16
2. 1. 1. Description.....16
2. 1. 2. Lithology 16
The Carboniferous pebbly – sandstone unit 16
The Carboniferous (Bashkirian) limestone-dolomite unit 16
The conglomeratic sandstone-mudstone unit 21
Blocky-turbiditic clastic unit 21
2. 1. 3. Contact relations 25
The Carboniferous pebbly – sandstone unit..... 25

The Carboniferous (Bashkirian) limestone unit 25
The conglomeratic sandstone-mudstone unit 25
Blocky-turbiditic clastic unit..... 26
2. 1. 4. Age.....26
2. 1. 5. Remarks 28

2. 2. GERENCE FORMATION..... 28
2. 2. 1. Description 28
2. 2. 2. Lithology.....30
2. 2. 3. Contact relations..... 36
2. 2. 4. Age.....36
2. 2. 5. Remarks 38

2. 3. CAMİBOĞAZI FORMATION.....39
2. 3. 1. Remarks..... 39
2. 3. 2. Laleköy member..... 39
2. 3. 2. 1. Description..... 39
2. 3. 2. 2. Lithology 40
2. 3. 2. 3. Contact 43
2. 3. 2. 4. Age.....44
2. 3. 2. 5. Remarks 47
2. 3. 3. Saplazdağı member..... 47
2. 3. 3. 1. Description..... 47
2. 3. 3. 2. Lithology..... 47
2. 3. 3. 3. Contacts.....50
2. 3. 3. 4. Age 50
2. 3. 3. 5. Remarks..... 51
2. 3. 4. Hanaylı member..... 53
2. 3. 4. 1. Description 53
2. 3. 4. 2. Lithology 53
2. 3. 4. 3. Contacts 53
2. 3. 4. 4. Age 56

2. 3. 4. 5. Remarks..... 56
2. 4. GÜVERCİNLİK FORMATION..... 58
2. 4. 1. Description..... 58
2. 4. 2. Lithology..... 58
2. 4. 3. Contacts..... 61
2. 4. 4. Age..... 61
2. 4. 5. Remarks..... 61
2. 5. NOHUTALAN FORMATION..... 64
2. 5. 1. Remarks..... 64
2. 5. 2. Lower limestone subunit..... 64
2. 5. 2. 1. Description..... 64
2. 5. 2. 2. Lithology..... 67
2. 5. 2. 3. Contacts..... 67
2. 5. 2. 4. Age..... 69
2. 5. 2. 5. Remarks..... 69
2. 5. 3. Upper limestone subunit..... 69
2. 5. 3. 1. Description..... 69
2. 5. 3. 2. Lithology..... 69
2. 5. 3. 3. Contacts..... 72
2. 5. 3. 4. Age..... 74
2. 5. 3. 5. Remarks..... 74
2. 6. BİRGİ FORMATION..... 74
2. 6. 1. Description..... 74
2. 6. 2. Lithology..... 75
2. 6. 3. Contacts..... 75
2. 6. 4. Age..... 77
2. 6. 5. Remarks..... 77

2. 7. AKTEPE FORMATION..... 77
2. 7. 1. Remarks..... 78
2. 7. 2. Limestone subunit..... 78
2. 7. 2. 1. Description..... 78
2. 7. 2. 2. Lithology 78
2. 7. 2. 3. Contacts..... 80
2. 7. 2. 4. Age..... 80
2. 7. 3. Limestone-conglomerate subunit..... 81
2. 7. 3. 1. Description..... 81
2. 7. 3. 2. Lithology..... 82
2. 7. 3. 3. Contacts..... 82
2. 7. 3. 4. Age..... 83

2. 8. STRUCTURAL PROPERTIES OF THE MESOZOİC FORMATIONS... 83
5. 8. 1. Thrust faults..... 83
5. 8. 2. Folds..... 84

Chapter Three
BIOSTRATIGRAPHY

3. 1. TRIASSIC..... 85
1. *Glomospira densa-Meandrospira dinarica* concurrent range zone..... 85
2. *Turriglomina mesotriassica* range zone..... 87
3. *Triadodiscus eomesozoicus* partial range zone..... 88
4. *Aulotortus communis* interval zone..... 88
5. *Triasina oberhauseri* range zone..... 89
6. *Triasina hantkeni* range zone..... 90

3. 2. JURASSIC..... 90
1. *Orbitopsella praecursor* range zone..... 90

Chapter Four

CARBONATE PETROGRAPHY, FACIES AND ENVIRONMENT

4. 1. PETROGRAPHICAL AND MICROFACIES ANALYSIS..... 92

4. 2. ENVIRONMENTAL ANALYSIS..... 93

4. 2. 1. Gerence Formation..... 93

4. 2. 2. Laleköy member of the Camiboğazı Formation..... 98

4. 2. 3. Saplazdağı member of the Camiboğazı Formation.....99

4. 2. 4. Hanaylı member of the Camiboğazı Formation..... 100

4. 2. 5. Güvercinlik Formation..... 100

4. 2. 6. Lower limestone subunit of the Nohutalan Formation..... 101

4. 2. 7. Upper limestone subunit of the Nohutalan Formation..... 102

4. 2. 8. Birgi Formayion..... 103

4. 2. 9. Aktepe Formation..... 103

Chapter Five
SYSTEMATIC PALEONTOLOGY

6. 1. TRIASSIC.....105

TRIASSIC TAXONOMY..... 105

FUSULININA 105

Earlandia..... 105

Earlandia amplimuralis 105

Earlandia tintiniformis 106

Earlandia gracilis 107

Endoteba 107

Endoteba contraversa 107

Endoteba ex. gr. *obturata* 109

Endoteba badoxi..... 110

Endotebanella 111

Endotebanella pentacamerata 111
Endotebanella kocaeliensis 112
Endotebanella sp. A 113
Endotebanella sp. B 113
Endotebanella sp. C 114
Endotebanella spp 115
Endotriada 115
Endotriada kuepperi 115
Endotriada thyrrhenica 116
Endotriada spp. 116
Endotriadella 117
Endotriadella wirzi 117
Endotriadella aff. *wirzi* 118
Endotriadella spp 119

TEXTULARIINA 119
Reophax 119
Reophax sp. (A) 119
Reophax sp. (B) 120
Reophax sp. (C) 121
Reophax sp. (D) 121
Reophax sp. (E) 122
Reophax sp 123
Glomogallerium 123
Glomogallerum mlavicensis 123
Glomogallerum gazdzickii 124
Ammobaculites 125
Ammobaculites ? sp 125
Textularia 125
"Textularia" n. sp 125
Trochammina 126
Trochammina cf. *almtalensis* 126
Trochammina jaunensis 127
Trochammina spp 128
Gandinella 129
Gandinella falsofriedli 129
Gandinella sp. aff. *falsofriedli* 130
Gandinella sp 131
Glomospira 131
Glomospira densa 131
Glomospira praedensa 133
Glomospira sp 134
Glomospirella 134
Glomospirella grandis ? 134
Glomospirella n. sp 135
Glomospirella rosetta 136
Glomospirella sp. aff. *rosetta* 137
Glomospirella spp 137

T.C. YÜKSEKÖĞRETİM KURULU
DOKÜMANTASYON MERKEZİ

Glomospirella gr. expansa 138
Glomospirella sp. (A)..... 139
Paulbrönnimannia 140
Paulbrönnimannia judicariensis 140
Paulbrönnimannella 141
Paulbrönnimannella cf. *whittakeri* 141
Ataxophragmiid Foram..... 141
Palaeolituonella..... 142
Palaeolituonella meridionalis 142
Palaeolituonella primativa n. sp..... 143

INVOLUTININA..... 144
Lamelliconus 144
Lamelliconus ventroplanus 144
Lamelliconus multispirus 146
Lamelliconus procerus 147
Lamelliconus biconvexus 148
Lamelliconus cf. *biconvexus*..... 149
Lamelliconus spp..... 150
Auloconus 150
Auloconus permodiscoides 150
Auloconus spp..... 151
Triadodiscus 151
Triadodiscus eomesozoicus 151
Aulotortus 153
Aulotortus praegaschei 153
Aulotortus friedli 154
Aulotortus gr. *sinuosus* 155
Aulotortus sinuosus pragsoides 156
Aulotortus communis 157
Aulotortus tumidus..... 158
Aulotortus impressus 159
Aulotortus tenuis 160
Aulotortus spp..... 161
Aulotortus sp. *or Glomospirella* sp..... 162
Triasina 162
Triasina oberhauseri 162
Triasina hantkeni..... 163

MILIOLINA 164
Arenovidalina 164
Arenovidalina amylovoluta 164
Arenovidalina chialingchiangensis 165
Arenovidalina spp..... 166
Cornuspira 167
Cornuspira sp. 167
Planiinvolutea 168
Planiinvolutea sp. 168

Meandrospira 168
Meandrospira cheni 168
? " *Meandrospira*" *deformata* 169
Meandrospira dinarica 169
Meandrospira pusilla 170
Meandrospira ? sp..... 171
Turriglomina 172
Turriglomina magna 172
Turriglomina mesotriasica 173
Turriglomina scandonei 174
Turriglomina spp..... 175
Karaburunia 175
Karaburunia triadica (ex. *Sigmoilina*) 175
Karaburunia ? sp..... 176
Ophthalmidium 177
Ophthalmidium tricki 177
Ophthalmidium exiguum 178
Ophthalmidium spp..... 179
Ophthalmidium sp. (A)..... 179
Ophthalmidium sp. 180
Paraophthalmidium 180
Paraophthalmidium sp. 180
Agathammina 181
Agathammina austroalpina 181
Agathammina ? iranica 182
Galeanella 182
Galeanella ? sp..... 182

SPIRILLININA 183
Turrispirillina 183
Turrispirillina sp..... 183

LAGENINA 183
Duostominid Foram (A)..... 184
Duostominid Foram (B)..... 184
Duostominid Foram (C)..... 185
Duostominid Foram (D)..... 185
Duostominid Foram (E)..... 186
Duostominid Foram (F)..... 187
Variostoma 187
Variostoma sp..... 187
Duostominidae..... 188

ROTALIINA 188
Nodosariid Foram..... 189
Austrocolomia 189
Austrocolomia sp..... 189
Foraminifer n. gen..... 189

Foraminifer n. gen. n. sp. 190
Unknown foraminifer (A)..... 191
Unknown foraminifer (B)..... 192
Unknown foraminifer (C) 192
Unknown foraminifer (D)..... 192

6. 2. JURASSIC..... 193

JURASSIC TAXONOMY..... 193

TEXTULARIINA..... 193
Nautiloculina 193
Nautiloculina sp..... 193
Mayncina.....194
Mayncina termieri 194
Bosniella 194
Bosniella ? sp..... 195
Labyrinthina 195
Labyrinthina cf. *recoarensis*..... 195
Labyrinthina sp..... 196
Orbitopsella 196
Orbitopsella primaeva..... 197
Orbitopsella aff. *primaeva*..... 198
Orbitopsella praecursor..... 198
Orbitopsella sp..... 199
Mesoendothyra 200
Mesoendothyra croatica ?..... 200
Amijiella 201
Amijiella amijii.....201
Pseudocyclammina 201
Pseudocyclammina liassica..... 201
Pseudocyclammina sp. (1)..... 202
Pseudocyclammina sp. (2)..... 203
Haurania 203
Haurania cf. *deserta*..... 203
Limognella 204
Limognella sp. 204
Trochammina 205
Trochammina sp. 205
Pfenderina 205
Pfenderina cf. *Trochoidea*..... 205
Pfenderina sp. (1).....206
Pfenderina sp. (2).....206
Siphovalvulina 207
Siphovalvulina sp. 207
Conicokurnubia 207
Conicokurnubia cf *orbitoliniformis* 208
Kilianina 208

Kilianina rahonensis 208
Kilianina cf. *lata* 209
Kilianina uzunkuyuiana n.sp 210
Kilianina sp 212
Parurgonina 212
Parurgonina caelinensis 212
Parurgonina cf. *caelinensis* 214

FUSULININA 215
Earlandia 215
Earlandia sp. 215

INVOLUTININA 215
Trocholina 215
Trocholina sp 215
Protopeneroplis 216
Protopeneroplis striata 216

LAGENINA 216
Lenticulina 217
Lenticulina sp 217

6. 3. EARLY CRETACEOUS 217

EARLY CRETACEOUS TAXONOMY 217

TEXTULARIINA 217
Mayncina 217
Mayncina bulgarica 217
Nezzazata 218
Nezzazata simplex 218
Nezzazata spp 218
Nezzazatinella 219
Nezzazatinella sp 219
Pseudocyclammina 219
Pseudocyclammina rugosa 219
Praechrysalidina 220
Praechrysalidina infracretacea 220
cf. *Praechrysalidina infracretacea* 221
Cuneolina 222
Cuneolina gr. *pavonia* 222
Cuneolina parva 222
Cuneolina sp. 223
Vercorsella 223
Vercorsella arenata 224
Sabaudia 224
Sabaudia minuta 224
Sabaudia cf. *capitata* 225

Dobrogelina 226
Dobrogelina ? sp 226
Orbitolinid foraminifer..... 227
Orbitolina 227
Orbitolina (*Conicorbitolina*) sp. 227
Orbitolina (*Conicorbitolina*) gr. *paenoconica* 228
Orbitolina sp. (1) 228
Orbitolina sp. (2) 229

FUSULININA 229
Earlandia 229
Earlandia sp..... 229

INVOLUTININA 230
Hensonina 230
Hensonina lenticularis 230

SPIRILLININA 230
Vidalina 231
Vidalina ? sp..... 231

MILIOLINA 231
Sigmoilina 231
Sigmoilina sp..... 231
Massilina 232
Massilina sp. 232
Nummoloculina 232
Nummoloculin heimi 232
Spiriloculina 233
Spiroloculina sp. 233
Foraminifer indet..... 233

GLOBUGERININA 234
Favusella 234
Favusella washitensis 234

ROTALIINA 234
Rotalia 234
Rotalia mesogeensis 235
Discorbidae 235
Valvulineria 236
Valvulineria sp..... 236

Chapter Six
CONCLUSIONS

7. 1. STRATIGRAPHIC CONGLUSION..... 237

7. 2. PALEONTOLOGİC CONCLUSIONS..... 241

REFERENCES

..... 244

LIST OF TABLES

Table 1. 1. Table showing the number of sample and thickness of stratotype sections with respect to formations..... 5

Table 1. 2. Fossil contents of the Brinkmann et al. (1972) and Erdoğan et al. (1990)..... 10

LIST OF FIGURES

Page

Figure 1. 1. Location map of the Study Area..... 2

Figure 1. 2. Comparison of the Stratigraphic Settings of the Paleozoic and Mesozoic Rock Unites, Proposed in the Previous Studies and This Study..... 4

Figure 1. 3. Comparison of the Stratigraphy of Brinkmann et al. (1972), Erdoğan et al. (1990) and This Study on the Central region of the Karaburun Peninsula..... 14

Figure 2. 1. Generalized Lithostratigraphic Columnar Section for the Map Area..... 17

Figure 2. 2a. Revised Distribution of the Rock Units in the Map Areas and Locations of the Stratigraphic Sections. 18

Figure 2. 2b. Cross Sections Showing Relations of the Rock Units in the Ildır Map Area (See Fig. 2. 2)..... 19

Figure 2. 3. Revised Distribution of the Rock Units in the Alandere Map Area, Location of Stratotype Section and Samples.....20

Figure 2. 4. Cross Section of the Alandere Stratotype Section (Stratotype no. 2) and Foraminiferal Content of the Carboniferous Limestone-Dolomite Unit..... 22

Figure 2. 5. Litostratigraphic Columnar Section of Alandere Stratotype Showing the Contact Between the Carboniferous Limestone-Dolomite Unit and Gerence Formation. 24

Figure 2. 6. Revised Distribution of the Rock Units in the Ildır Map Area and Locations of the Stratotype Section. 27

Figure 2. 7. Revised Distribution of the Rock Units in the Nohutalan Map Area and Locations of the Stratotype Section. 29

Figure 2. 8. Litostratigraphic Columnar Section of the Narlıcak Stratotype Section (Stratotype no. 1)..... 31

Figure 2. 9. Litostratigraphic Columnar Section of the Gerence Formation in the Domuzçukuru Stratoype Section (Stratotype no. 3)..... 33

Figure 2. 10. Fossil Content of the Triassic Formations in the Nohutalan Mahalle Stratotype Section (Stratotype no. 11)..... 34

Figure 2. 11. Stratigraphic Distribution of the Foraminifers in the Gerence Formation (Stratotype no. 1)..... 37

Figure 2. 12. Litostratigraphic Columnar Section of the Laleköy Member of the Camiboğazı Formation in the Narlıcak Stratotype Section (Stratotype no. 1)..... 41

Figure 2. 13. Stratigraphic Distribution of the Foraminifers in the Laleköy Member of the Camiboğazı Formation (Stratotype no. 1).....45

Figure 2. 14. Litostratigraphic Columnar Section of the Saplazdağı Member of the Camiboğazı Formation in the Narlıcak Stratotype Section (Stratotype no. 1)..... 48

Figure 2. 15. Stratigraphic Distribution of the Foraminifers in the Saplazdağı Member of the Camiboğazı Formation (Stratotype no. 1).....52

Figure 2. 16. Litostratigraphic Columnar Section of the Hanaylı Member of the Camiboğazı Formation in the Narlıcak Stratotype Section (Stratotype no. 1).....54

Figure 2. 17. Litostratigraphic Columnar Section of the Hanaylı Member of the Camiboğazı Formation in the Camiboğazı Stratotype Section (Stratotype no. 5). 55

Figure 2. 18. Stratigraphic Distribution of the Foraminifers in the Hanaylı Member of the Camiboğazı Formation (Stratotype no. 1)..... 57

Figure 2. 19. Litostratigraphic Columnar Section of the Güvercinlik Formation in the Salıyeri Dağı (Stratotype no. 4) and Nohutalan Stratotype (Stratotype no. 12) Sections.....59

Figure 2. 20. Stratigraphic Distribution of the Foraminifers in the Güvercinlik Formation. (Stratotype nos. 4 and 12)..... 62

Figure 2. 21. Litostratigraphic Columnar Section of the Contact Interval Between the Hanaylı Member and the Güvercinlik Formation (Stratotype no. 8). 63

Figure 2. 22. Revised Distribution of Rock Units in the Barbaros Map Area and Location of the Stratotype Section. 65

Figure 2. 23. Cross Sections Showing Relations of the Rock Units in the Barbaros Map Area (See Fig. 2. 21)..... 66

Figure 2. 24. Litostratigraphic Columnar Section and Fossil Content of the Lower and Upper Limestone Units of the Nohutalan Formation (Stratotype no. 13).....68

Figure 2. 25. Stratigraphic Distribution of the Foraminifers in the Lower Limestone Subunit of the Nohutalan Formation (Stratotype no. 13). 70

Figure 2. 26. Litostratigraphic Columnar Section and Fossil Content of the Lower and Upper Limestone Units in the Örendağı Stratotype Section (Stratotype no. 14).....71

Figure 2. 27. Litostratigraphic Columnar Srction of the Contact Between the Upper Limestone Subunit of the Nohutalan Formation and the Birgi Formation (Stratotype no. 16).....73

Figure 28. Litostratigraphic Columnar Section and Fossil Content of the Birgi Formation in the Örendağı Stratotype Section (Stratotype no. 14)..... 76

Figure 2. 29. Litostratigraphic Columnar Section and Fossil Contant of the Limestone Subunit of the Aktepe Formation in Aktepe Stratotype Section (Stratitype no. 15).....79

Figure 3. 1. The Stratigraphic Distribution of Foraminifers and Biozones of the Triassic Formations. 86

Figure 4. 1. Vertical Facies Changes in the Triassic Formations (Stratotype no. 1)..... 94

Figure 4. 2. Vertical Facies Changes in the Nohutalan Formation (Stratotype no. 14)..... 95

Figure 4. 3. Vertical Facies Changes in the Birgi Formation (Stratotype no. 14 and 15)..... 96

Figure 4. 4. Vertical Facies Changes in the Limestone Subunit of the Aktepe Formation (Stratotype no. 15).....97

APPENDICES

Table 4. 1-10

Plates 1-87

CHAPTER ONE

INTRODUCTION

In western Turkey, to the west of İzmir, in the Karaburun Peninsula, a thick succession of Mesozoic carbonate rocks has been subjected to detailed investigations. The assemblage is bounded by a clastic assemblage, in parts, Late Cretaceous and Paleozoic and/or Triassic in age. In a broader framework, both assemblages are surrounded by the Menderes massive and Lycian nappes of the Taurids to the south, the İzmir-Ankara Zone to the east and the Cyclades crystalline massive to the west (Fig. 1. 1 a).

1. 1. STUDY AREA

The study area is located in the central part of the Karaburun Peninsula, about 70 km west of İzmir; in 1/25 000 scale Urla L16 b3, Urla L17 a4 and Urla K16 b2 sheets. It lies between Uzunkuyu, Barbaros, Kadıovacık, Nohutalan, Germeyan and Ildır villages. İzmir-Çeşme highway passes through southern part of the study area. Uzunkuyu, Birgi and Nohutalan villages are on the İzmir-Çeşme highway, access to Ildır, Barbaros and Kadıovacık villages is by İzmir-Ildır and Çeşme-Ildır highways (Fig. 1. 1 b)

The study area was divided into the Ildır, Nohutalan and Barbaros map areas (Fig. 1b). The Barbaros map area lies between Barbaros, Birgi and Kadıovacık villages. The Nohutalan map area extends between Birgi, Uzunkuyu, Nohutalan and Germeyan villages. The Ildır map area is situated between Ildır, Kadıovacık and Germeayan villages.

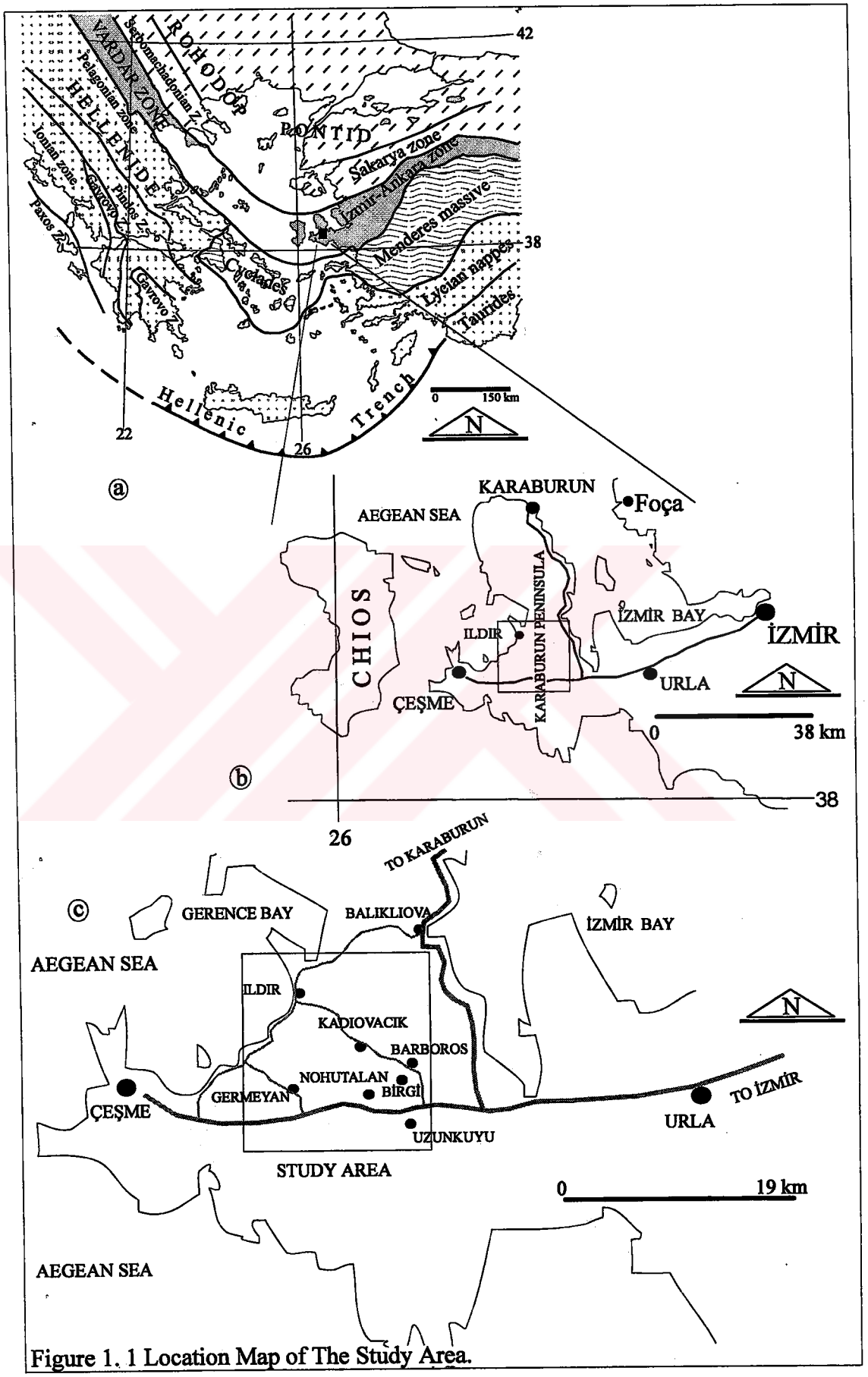


Figure 1. 1 Location Map of The Study Area.

1. 2. PURPOSE AND METHODS

The previous studies carried out in the last 40 years have brought four different and even contradictory stratigraphic resolutions on the Lower Triassic to Lower Cretaceous carbonate assemblage (Fig. 1.2). Similarly, different age assignments have been presented on the basis of radiolaria , conodont and foraminiferal microfauna, and algal flora in relation to randomly collected samples or loosely sampled type sections. This study aims to present a detailed stratigraphy of the earliest Triassic to Early Cretaceous carbonate succession, on the basis of detailed geological mapping and stratigraphic section measuring to investigate foraminiferal microfauna and algal microflora and to explaine environmental and facies changes based on petrographic evidence.

The stratigrapic studies carried out in the Ildır, Barbaros and Nohutalan map areas, which include basement, Lower Triassic to Upper Triassic, Upper Triassic to Middle Cretaceous and Lower Triassic to Lower Jurassic rocks respectively.

In the Ildır map area, in the Narlıca ((1) on the maps), Camiboğazı (5), Alandere (2), Domuzçukuru (3), Saplaz dağı I (6), Saplaz Dağı II (7), Kadıovacık road (8), Kırıkpınar (9) and the Salıyeri dağı (4) localities, in the Nohutalan map area, the Güvercinlik (10), Nohutalan mahalle (11), Çeşme road (Uzunkuyu) (139, and the Nohutalan village (12), in the Barbaros map area, Örendağı and Çengendağı (14), Aktepe (15) and the Akdağ localities, 15 stratotype and/or boundary stratotype and/or suplemantary stratigraphic section were studied (Fig. 1. 2). Distribution of the studied stratigraphic section and collected samples with respect to formations are given in Table 1.1.

In all map areas selection and measuring of stratotypes and suplemantary stratigraphic section are based on geological mapping in the scale of 1/10 000. For convenience in presentation, the scale of the maps are reduced to different scales, such as 1/50 000 and 1/25 000.

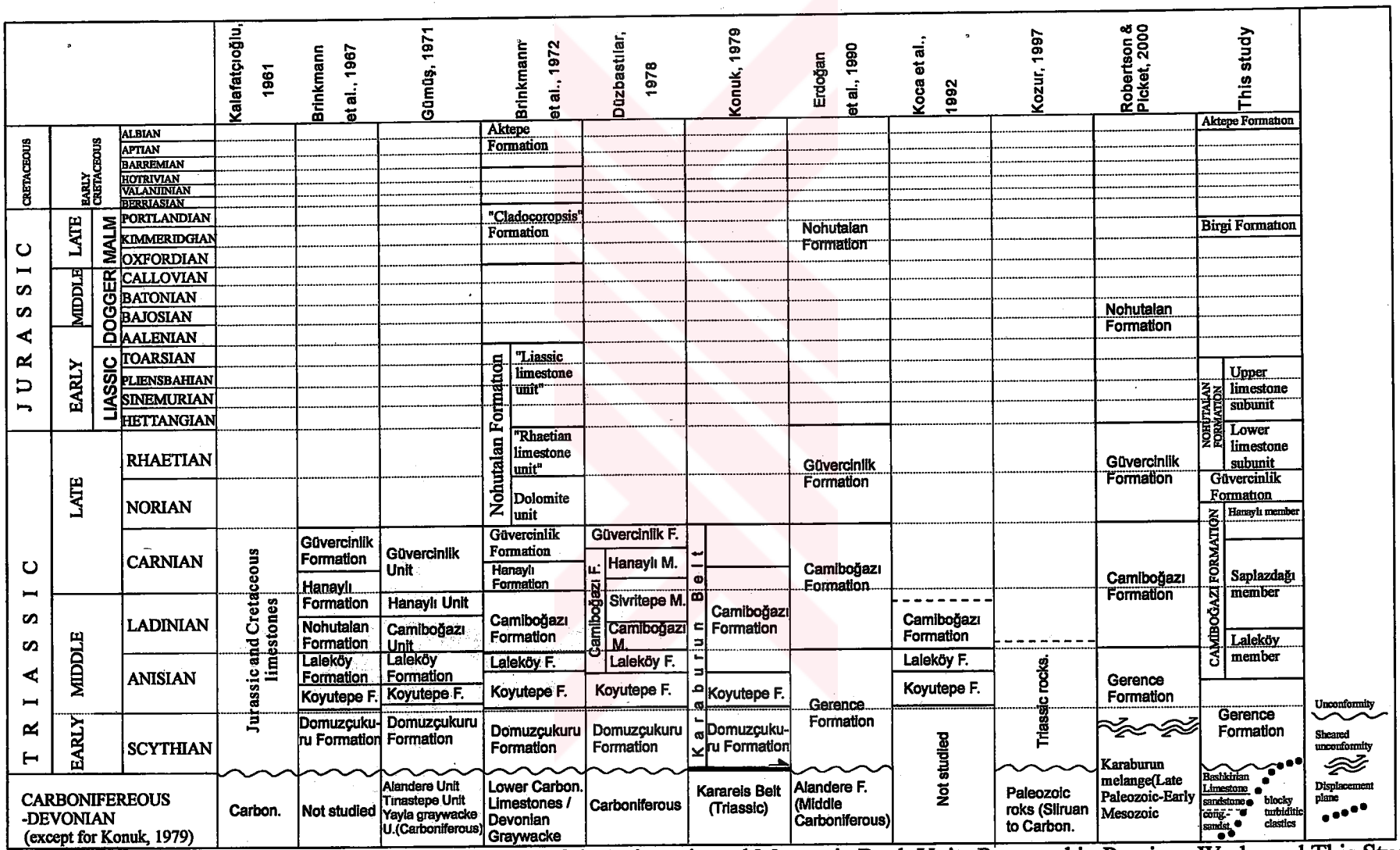


Figure 1. 2 Comparison of the Stratigraphic Settignes of the Paleozoic and Mesozoic Rock Units Proposed in Previous Works and This Study.

Table 1. 1. Cumulative Thickness, Sample Content of Stratotypes and Their Distribution in the Map Areas.

	STRATOTYPE AND STRATOTYPE NO ⑯	FORMATIONS	THICKNESS	NUMBER OF SAMPLES
BARBOROS MAP AREA	AKDAĞ STRATOTYPE ⑯	UPPER LIMESTONE UNIT OF THE NOHUTALAN FORMATION + BİRGİ FORMATION + AKTEPE FORMATION	260 m	80
	AKTEPE STRATOTYPE ⑮	BİRGİ FORMATION + AKTEPE FORMATION	600 m	170
	ÖRENDAĞI STRATOTYPE + ÇENGENDAĞI STRATOTYPE ⑭	LOWER AND UPPER LIMESTONE UNIT OF THE NOHUTALAN FORMATION + BİRGİ FORMATION	700 m 14 m	223 16
NOHUTALAN MAP AREA	ÇEŞME YOLU STRATOTYPE ⑬	LOWER AND UPPER LİMESTONE UNIT OF THE NOHUTALAN FORMATION	173 m	46
	NOHUTALAN VILLAGE STRATOTYPE ⑫	GÜVERCİNLİK FORMATION	45 m	10
	NOHUTALAN MAHALLE STRATOTYPE ⑪	LOWER LİMESTONE UNIT OF THE NOHUTALAN FORMATION +GERENCE F. + LALEKÖY MEMBER + SAPLAZDAĞI M.	728 m	82
	GÜVERCİNLİK STRATOTYPE ⑩	LOWER LİMESTONE UNIT OF THE NOHUTALAN FORMATION	221 m	78
ILDIR MAP AREA	KIRIKPINAR TEPE STRATOTYPE ⑨	GÜVERCİNLİK FORMATION + SAPLAZDAĞI MEMBER + HANAYLI MEMBER	90.7 m	10
	KADIOVACIK YOLU STRATOTYPE ⑧	HANAYLI MEMBER + GÜVERCİNLİK FORMATION	121 m	40
	SAPLAZDAĞI II STRATOTYPE ⑥	GÜVERCİNLİK FORMATION + SAPLAZDAĞI MEMBER + HANAYLI MEMBER	182.4 m	27
	SAPLAZDAĞI I STRATOTYPE ⑦	SAPLAZDAĞI MEMBER + HANAYLI MEMBER	113.6 m	13
	CAMİBOĞAZI STRATOTYPE ⑤	SAPLAZDAĞI MEMBER + HANAYLI MEMBER	150 m	75
	DOMUZÇUKURU STRATOTYPE ③	GERENCE FORMATION	250 m	76
	SALIYERİDAĞI STRATOTYPE ④	GÜVERCİNLİK FORMATION	69 m	29
	NARLICA COMPOSITE STRATOTYPE ①	CAMİBOĞAZI FORMATION: HANAYLI MEMBER / SAPLAZDAĞI MEMBER / LALEKÖY MEMBER; GERENCE FORMATION	1270 m	439
	ALANDERE STRATOTYPE ②	BASEMENT ROCKS + GERENCE FORMATION	210 m	86
		TOTAL	5076.7 m	1500
		TOTAL THINSECTION NUMBER		~2000

In stratigraphic nomenclature, the terminology of the Brinkmann et al. (1972), Dragastan & Düzbastılar (1992) and Erdoğan et al. (1990) were used and lower and upper boundries of some of the formations are redefined.

The micropaleontologic elements and petrographic properties of collected samples are based on about 2000 thin sections prepared from 1500 systematically collected rock samples. An Olimpus research microscope is used in taking the photographs of foraminifers, algae and microfacies.

The thesis was arranged in terms of the rules of the Graduate School of Natural and Applied Sciences of Dokuz Eylül University.

1. 3. PREVIOUS STUDIES

1. 3. 1. Previous studies on stratigraphy

Comparison of previous studies is given in Fig. 1. 2. The central part of the Karaburun Peninsula, in sourroundings of Nohutalan, Barbaros, Birgi, Kadıovacık, Germeyan and Ildır villages (Fig. 1a), is represented by a carbonate succession. KALAFATÇIOĞLU (1964) who carried out the pioneering work, recorded a thick carbonate sequence of Jurassic to Cretaceous age unconformably overlying the Paleozoic rocks. BRINKMANN et al. (1967) recorded, for the first time, the presence of Early-Middle Triassic pelagic and the Middle-Late Triassic large *Megalodont*-bearing limestones and divided the carbonat assemblage into the Domuzçukuru, Koyutepe, Laleköy, Nohutalan, Hanaylı, Güvercinlik and Saplaz units.

Gümüş (1971), in parallel with Brinkmann et al. (1967), noted that the Lower Triassic to Carnian rocks unconformably rest on the probable Devonian to Carboniferous rocks. He recognized the Carboniferous Yayla Graywacke, Tınaztepe and Alandere units in the vicinity of Ildır Village.

Brinkmann et al. (1972) established the Paleozoic to Early Cretaceous stratigraphy for the first time, in the central part of the Karaburun Peninsula (Fig. 1. 2), to comprise from base to top, the following rock units (original "schichten" is replaced here for practical purposes with "formation"): The Devonian to Carboniferous basement rocks, the Scythian Domuzçukuru Formation, the Anisian Koyutepe Formation, the Late Anisian Laleköy Formation, the Ladinian Camiboğazı Formation, the Early Carnian Hanaylı Formation, the Middle to late Carnian Güvercinlik Formation, the Norian to Liassic Nohutalan Formation, the Malm "*Cladocoropsis* Schichten" and the Early Cretaceous Aktepe Formation. They divided the Nohutalan Formation into (1) the Dolomite unit, (2) the "Rhaetian limestone" and the "Liassic limestone" units. They also recognized, from base to top, the foraminifer and gastropod-bearing limestone, and limestone-conglomerate-marn units in the Aktepe Formation. They noted that the Lower Triassic rocks would unconformably overlie the Devonian to Carboniferous graywacke and limestone units. They emphasized an Early Triassic to Liassic continuous succession, an hiatus between Liassic limestones and "Cladocoropsis Schichten" and an unconformable contact defined by bauxite between "Cladocoropsis Schichten " and Cretaceous Aktepe Formation.

Düzbastılar (1978), in support Brinkmann et al. (1972), established Sivritepe Member in the Camiboğazı Formation and assembled all the Laleköy, Camiboğazı, Sivritepe and Hanaylı Members under the name of the Camiboğazı Formation. The author differs from Brinkmann et al. (1972) on the age of some units. The Hanaylı member, Güvercinlik Formation and Nohutalan Formation, in accending order, are Ladinian-Carnian, Middle Carnian and Carnian to Rhaetian in age.

Konuk (1979) emphazied the existence of the Domuzcukuru and Camiboğazı formations (the "Karaburun Assemblage"), in the northwest of the Karaburun Peninsula, claiming that both formations would tectonically rest on the Triassic Karareis Assemblage.

Erdoğan et al. (1990), redefined the whole stratigraphy of the Peninsula, and distinguished the Denizgiren group including the Scythian-Anisian Karareis and Gerence formations, respectively, consisting of turbiditic clastics and limestone-rich clastics, and laterally intergrading. The Gerence Formation corresponds to the Domuzçukuru, Koyutepe and Laleköy formations of Brinkmann et al. (1972). They considered the Hanaylı Formation and Dolomite and "Rhaetian limestone" units of the Nohutalan Formation of Brinkmann et al. (1972) as part of the Güvercinlik Formation. The authors named the "Liassic limestone" unit of the Nohutalan Formation, "*Cladocoropsis*" formation and the Aktepe Formation of the Brinkmann et al. (1972) as the Nohutalan Formation. The Scythian to Anisian Gerence Formation rests unconformably on the Carboniferous (Bashkirian) Alandere Formation. A continuous Early Triassic to Early Cretaceous carbonate platform sequence would be interrupted by the Albian bauxite deposition under local subaerial conditions.

Koca et al. (1992), reported that the Laleköy Formation is Anisian in age with respect to conodont micropaleontology.

Dragastan & Düzbastılar (1993), proposed to replace the name of the Birgi Formation for the "*Cladocoropsis limestone*" (Brinkmann et al. 1972).

İşintek et al. (1998) emphasized that hiatuses exist between Liassic and Kimmeridgian and Kimmeridgian and Aptian-Albian carbonate units respectively. The datings of the hiatuses were based on foraminiferal fauna and algal flora.

İşintek & Altıner (1998) indicated that the Late Early Cretaceous carbonate rocks overlie unconformably both the Kimmeridgian and Liassic carbonate rocks.

Masse & İşintek (2000) noted that the Aktepe Formation includes an algal flora indicating both Mediterranean cosmopolite, and Arab-African origin. The Formation is the Albian in age and has a soutern Mediterranean Tethyan paleogeographic origin.

Kaya (2000), stated that "the generalized rock succession of the Karaburun Peninsula can be divided into four entities, in ascending order, a turbidite, a lower olistostrome typified by Palaeozoic to Triassic clasts, a megabreccia constituted by Triassic to Cretaceous carbonates and an upper olistostrome comprising Triassic to Cretaceous carbonate clasts".

İşintek et al. (2000) revised the geology of the Late Triassic to Early Cretaceous rocks, and emphasized that both the Liassic to Kimmeridgian and Kimmeridgian to Albian hiatuses are represented with bauxitic truncation surfaces.

Robertson and Pickett (2000) interpreted that the Karareis Formation of the Erdoğan et al. (1990) is a melange, and the contact between the melange and the overlying "Lower to Middle Triassic platform successions" is a sheared unconformity. They also noted the existence of a disruption in the platform succession in the Late Triassic, Early Jurassic boundary. Comparison of the all previous studies are given in Fig. 1. 2.

1. 3. 2. Previous studies on paleontology

Brinkmann et al. (1967) first recorded the Triassic ammonites in the Koyutepe and Laleköy formation.

Brinkmann et al. (1972) first described, in detail, the micro and macrofaunas and microflora of the Triassic to Cretaceous carbonate succession in the central region of the Karaburun Peninsula. The fossil content and suggested age of the Mesozoic Formations raported by authors are presented in Table 1. 2.

Erdoğan et al. (1990) recorded a foraminiferal and algal assemblage including some problematica and sponge which all were determined by Prof. Dr. Demir Altıner. Distribution of the foraminifers and the algaes in the Mesozoic formations and suggested ages are given in Table 1. 2. Comparison of the stratigraphy of Brinkmann et al. (1972) and Erdoğan et al. (1990) is presented in Figure 1. 3.

Table 1. 2. Fossil Content of the Mesozoic Formations Reported by Brinkmann et al. 1972 and Erdoğan et al. 1990

Brinkmann et al. 1972			Erdoğan et al. 1990
			Scythian- Anisian
LALEKÖY F.		Saccamina ? sp. (F) Diplotremina ? sp. (F) Duostomina cf. turboidea (F) Spirillina sp. (F) Sigmoilina ? triadica (F) Karaburunia rendeli (F) P. ? praeorbicularis (F) Praeophthalmidium (n. sg.) tricki (F) Textularia virgilensis (F) Ammodiscela n. sp.(F) Ammodiscus sp.(F) Glomospira sp.(F) Hindeodella petrae-viridis (C) Spathognathodus aff. cristagalli (C) Gladigondolella tethydis (C) Gondolella navicula (C) Hungarella sp. (O) Pseudohealdia ? aff bispinosa (O) Pseudohealdia ? aff bispinosa (O) Monoceratina ? sp. (O) Policope aff. cincinnata (O) Prychobairdia sp. (O) Bairdia aff. permagna (O)	see next page for fossil content
KOYUTEPE F.	Anisian	Prychites (Malletoptychites) pseudopauli (A) Acrochordiceras cf. bithynicum (A) Orthoceras sp. (A) Acrochordiceras pustericum (A) Zenoites cf. helenae (A) Z. ex gr. helenae (A) Arcestes (Pararcestes) cf. carinatus (A) Leophyllites confucii (A) Ptychites (Discoptychites) sattneri (A) Hollandites sp. (A) Paraceratites sp. (A) Hindeodella sp. (C) Spiriferina cf. sublilangensis (B) Spirifera cf. hofmanni (B) Natica sp. (G)	
DOMUZCUKURU FORMATION	Scythian	Textularia virgilensis (F) Prioniodina sp. (C) Lonchodina mulleri (C) Spathognathodus cristagalli (C) Gondolella cf. mombergensis (C) Hindeodella triassica (C) Prioniodina cf. prona (C) Ozarkodina sp. (C) Enantiognathus sp. (C) Gondolella mombergensis (C) G. ? navicula (C) "Hindeodella" raridenticulata (C) Prioniodina mediocris (C) aff. Prioniodella pectiformis (C) Neoprioniodus ex aff. bransoni (C) Neoprioniodus ex aff. bransoni (C) Parachirognatus sp. (C) Leiophyllites kingi (A) E. betilloni var. evoluta (A) Eophyllites praeconpucii (A) Eogimnites cf. arthabere (A) Anakashmirites angustecostatus (A) A. cf. angustecostatus (A) Kashmirites sp. (A) Kashmirites armatus (A) Procarnites kokeni (A) Procarnites skanderbegis (A) Paranannitidae n. gen. sp. aff. Arnautoceltites (A) Leiophyllites pradyumna (A) Leiophyllites pitamaha (A) Ptychites (Flexoptichites) cf. indistincutus (A) Danubites sp. juv. (A) Isculites globulus (A) I. aff. globulus (A) Pseudomonotis reticulata (P) P. cf. inaequicostata (P) Gervilleia sp. (P) Mitophoria sp. (P) Spiriferina cf. sublilangensis (B) Spiriecra cf. hofmanni (B) Natica sp. (G)	

(F)Foraminifer (C)Conodont (O)Ostracode (A)Ammonit (P)Pelecypoda (B)Brachiopoda (G)Gastropoda

Continued

Brinkmann et al. 1972	LALEKÖY FORMATION	Late Anisian					Scythian-Anisian	GERENCE FORMATION	Erdoğan et al. 1990
			Prioniodina kochi (C)	Megaphyllites sandalinus. (A)					
			Enathiognathus sp. (C)	P. (Psilocladiscites) molaris v. (A)					
			Diplododella sp. (C)	P. (Procladiscites) aff. schlosseri (A)					
			Neoprioniodus bransoni (C)	Procladiscites (Procladiscites) proponticus (A)					
			Parachirognathus n. sp. (C)	Arcestes (Pararcestes) cf. carinatus (A)	Michelinoceratidae (A)				
			Parachirognathus ethingtoni (C)	Arcestes (Proarcestes) escheri (A)	Leiophyllites pitamaha (A)	Daonella ? sp. (B)			
			Prioniodella ctenoides (C)	Arcestes (Proarcestes) cf. balfouri (A)	Leiophyllites confucii (A)	Ammodiscus sp.. (F)			
			Lonchodina venusta (C)	Arcestes (Proarcestes) extralabiatus (A)	Monophyllites aff. artyhaberi (A)	Ophthalmidium sp. (F)			
			Lonchodina spengleri (C)	Arcestes (Proarcestes) bramantei (A)	Japonites n. sp. aff. chandra (A)	Tubiphytes obscurus (Ag)			
			Hindeodella triasica (C)	Balatonites corvini (A)	Gymnites bosnensis (A)	Reophax sp. (F)			
			Hindeodella petrae-viridis (C)	Balatonites semilaevis (A)	Gymnites toulai (A)	Nodosaria aff. ordinata (F)			
			Spathognathodus aff. cristagalli (C)	Pseudodanubites diritarashtra (A)	Gymnites incultus (A)	Glomospira aff. densa (F)			
			Gladigondolella tethydis (C)	Danubites intermedius (A)	Parasturia cf. mohamedi (A)	Meandrospira sp. (F)			
			Gondolella navicula (C)	Paraceratites sp. (A)	Sturia cf. sansovinii (A)	Spirorbis phlyctaena			
			Hungarella sp. (O)	Holandites ex gr. airavata (A)	P. (Malletoptychites) ex aff.malletianus (A)	Glomospirella cf. shengi (F)			
			Pseudohealdia ? aff. bispinosa (O)	Nicomedites osmani (A)	Ptychites (Flexoptychites) flexuosus (A)	Glomospira sp. (F)			
			Pseudohealdia ? aff bispinosa (O)	Beyrichites kazmaliensis (A)	Ptychites (Discoptychites) suttneri (A)	Aulotortus sp. (F)			
			Monoceratina ? sp. (O)	Beyrichites khanikofi (A)	Ptychites (Aristoptychites) n. sp. (A)	Globochaete sp. (PR)			
			Policope aff. cincinnata (O)	Acrochordiceras cf. halili(A)	Ptychites (Ptychites) cf. eusomus (A)	Ophthalmidium sp. (F)			
			Ptychobairdia sp. (O)	Acrochordiceras balarama(A)	Ptychites (Ptychites) cf. seroplicatus v. (A)	Ophthalmidium? chialingchiangense (F)			
			Bairdia aff. permagna (O)	Acrochordiceras pustericum(A)	Ptychites (Ptychites) cf. patens v.(A)	Planiinvolutina ? sp. (F)			
				Prahedenstroemia sp (A)	Ptychites (Ptychites) oppeli (A)	Meandrospira dinarica (F)			

(F)Foraminifer (C)Conodont (O)Ostracode (A)Ammonite (P)Pelecypoda (B)Brachiopoda (G)Gastropoda (Ag)Alg (S)Sponge (Co)Coral (PR)Problematica

Continued

Brinkmann et al. 1972				Erdoğan et al. 1990			
CAMİBOĞAZI F.	HANAYLI F.			CAMİBOĞAZI F.	GÜVERCİNLİK F.		
Ladinian	Early Carnian			Ladinian-Carnian	Norian-Rhaetian		
	Physoporella heraki (Ag)			Aulotortus tenuis (F)	Triasina hantkeni (F)		
	Poikiloporella dublicata (Ag)			Triadodiscus eomesozoicus ? (F)	Auloconus permodiscoides (F)		
	Gyroporella ladinica (Ag)			Aulotortus communis (F)	Aulotortus sinuosus sinuosus (F)		
	Gyroporella maxima (Ag)			Aulotortus sinuosus pragsoides (F)	Glomospira sp. (F)		
	Solenopora sp. cf. S. sp. 1 (Ag)			Aulotortus friedli (F)	Ataxophragmiidae sp. (F)		
	Trigonodus sp. (B)			Aulotortus gr. sinuosus (F)			
	Neomegalodon sp. (B)			Aulotortus praegaschei ? (F)			
	Daonella sp. (B)			Aulotortus tumidus (F)			
	Chemnitzia sp. (S)			Lamelliconus sp. (F)			
	Colospongia catinulata (S)	Macroporella cf. retica (Ag)		Agathammina ? sp. (F)			
	Involutina cf. pragsoides (F)	Macroporella humilis (Ag)		Aulotortus sp. (F)			
	Teutloporella tabulata (Ag)	Codiaceae sp. div. (Ag)		Trochammina sp. (F)	Glomospirella sp.(F)	Duostominidae (F)	
	Oligoporella pilosa variacans (Ag)	Tubiphytes obscurus (Ag)		Turritellella ? sp. (F)	Ataxophragmiidae (F)	Endothyra sp.(F)	
	D. philosophi philosophi (Ag)	Ladinella porata (Ag)		Endothyranella ? sp. (F)	Palaeolituonella majzoni?(F)	Lamelliconus sp(F)	
	Diplopora annulatissima (Ag)	Thecosmilia sp. (Co)	Orthonella sp. (Ag)	Earlandia amplimuralis (F)	Spiriamphorella sp. (F)	Lamelliconus? procerus(F)	
	Diplopora anulata anulata (Ag)	Holocoelia toulai (P)	Diplopora anulata (Ag)	Earlandia gracilis (F)	Tubiphytes morronensis (Ag)	Agathammina ? sp. (F)	
	Andrusporella cf. A. fusani (Ag)	Celyphia submarginata (P)	Teutloporella peniculiformis (Ag)	Reophax sp. (F)	Agathammina ? iranica (F)	Muranella spherica (PR)	
	Tubiphytes sp. (Ag)	Dictyocoelia manon (P)	Teutloporella chia (Ag)	Cayeuxia sp. (Ag)	Baccanella floriformis (PR)	Ammobaculites sp.(F)	
	Teutloporella triasina (Ag)	Vesicocaulis sp. (F)	Teutloporella nodosa (Ag)	Nodosaria sp. (F)	Radiolaria (R)	Nodosariidae (F)	
	Plammina semiplana (F)	Amblysiphonella sp. (F)	Teutloporella herculea (Ag)	Tubiphytes obscurus. (Ag)	Paraophthalmidium sp. (F)	Earlandia sp. (F)	
	Glomospira densa (F)	Uvanella irregularis (F)	Cladogirvanella cipitensis (Ag)	Tubiphytes ? sp. (Ag)	Microtubus sp. (Ag)	Aulotortus sp. (F)	

(F)Foraminifer (C)Conodont (O)Ostracode (A)Ammonite (P)Pelecypoda (B)Brachiopoda (G)Gastropoda (Ag)Alg (S)Sponge (Co)Coral (PR)Problematica

Continued

| Brinkmann et al. 1972 | | |

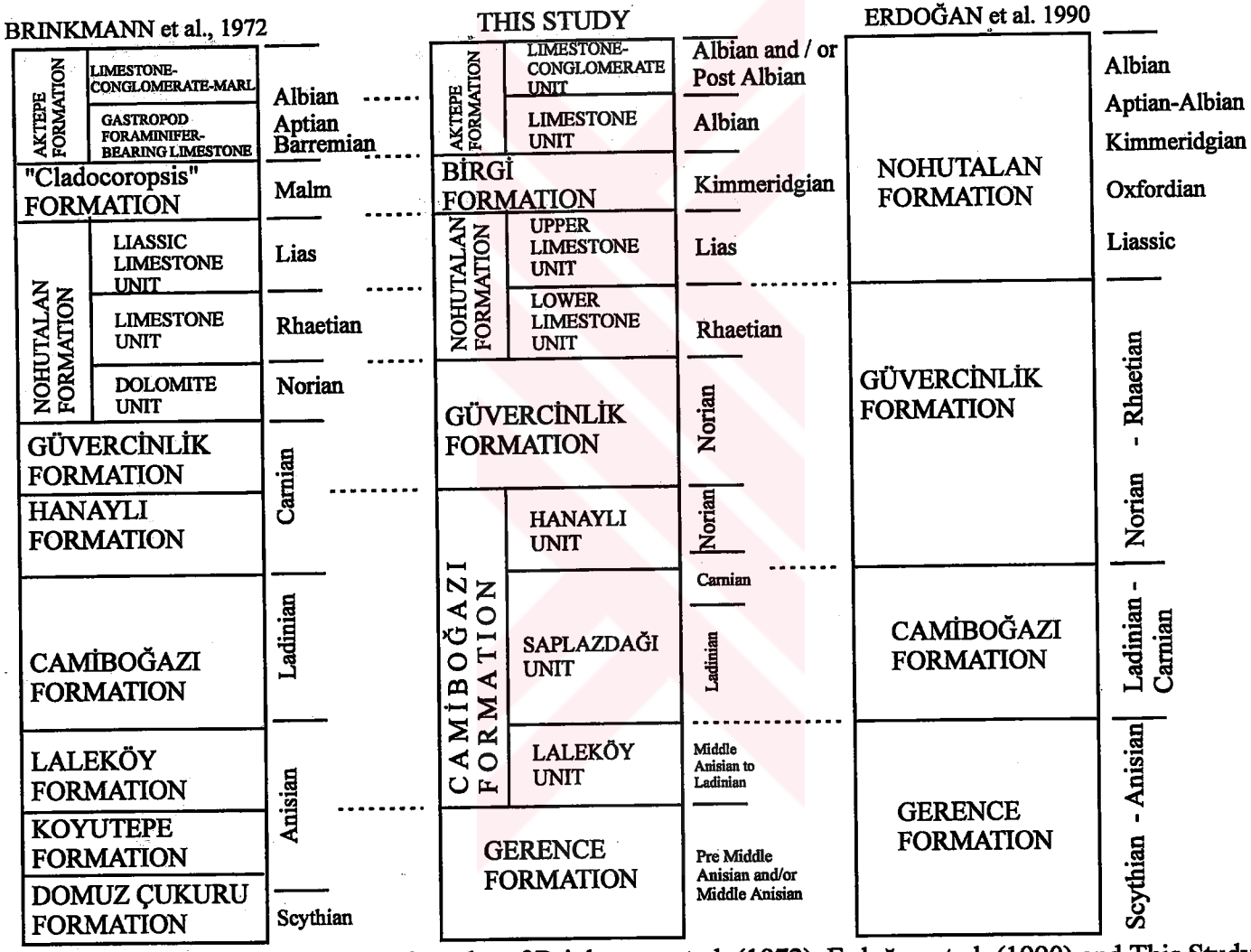


Figure 1. 3 Comparison of the Stratigraphy of Brinkmann et al. (1972), Erdoğan et al. (1990) and This Study on the Central Karaburun Peninsula.

Dragastan & Düzbastılar (1993) described *Mitcheldeania brinkmanni* n. sp. (Cyanophyta), *Pratumiella birgiensis* n. sp. (Chlorophyta) and *Permocalculus anatolicus* n. sp. (Rhodophyta) and the *Porphirotubus* sp., in the Birgi Formation corresponding to the "*Cladocoropsis Formation*" of Brinkmann et al. (1972).

Masse & İşintek (2000) noted that the Aktepe Formation includes *Cylindropoorella ivanovici*, *Hensonella urladanasi*, *Heteroporella lepina*, and *Salpingoporella hasi* indicating a Mediterranian cosmopolitic origin, and *Cylindropora kocanskayae*, *Salpingoporella* ? cf. *turgida*, *S.* cf. *milovanovici* and *Tequemella* cf. *antiqua* reflecting an Arabo-African origin. They reported that the Formation is Albian in age.

CHAPTER TWO
STRATIGRAPHY

The generalized rock succession and revised distribution of the rock units of the studied parts of the Karaburun Peninsula, as an implication of this study, is given in Figs. 2. 1 and 2.

2. 1. BASEMENT UNITS

2. 1. 1. Description: The basement rocks underlying the Triassic carbonate succession are exposed in Alandere and Narlıcak locations, respectively to the north and south of the Ildır village, and in the Domuzçukuru and Laleköy locations, to the northwest of the Germeyan village (Fig. 2. 3). The basement rocks underlying the Triassic carbonate succession can be investigated in four groups, which have problematic stratigraphic relations with each other and with the overlying Triassic rocks. They consist of the 1) Carboniferous pebbly-sandstone, 2) Carboniferous (Bashkirian) limestone-dolomite, 3) conglomeratic sandstone-mudstone and 4) the blocky-turbiditic clastic units.

2. 1. 2. Lithology: The Carboniferous pebbly–sandstone unit comprises green, medium to thick-bedded, locally pebbly, lithic sandstone intercalating with fine-grained conglomerate. Sandstone components are angular to subrounded and include quartz, polycrystalline quartz of metamorphic derivation, metamorphic rock fragments of micaschists, metaquartzite; chloritized volcanic rocks and muscovite.

The Carboniferous (Bashkirian) limestone-dolomite unit is composed of grey, dark grey to black, medium to very thick-bedded, massive limestone, dolomitic

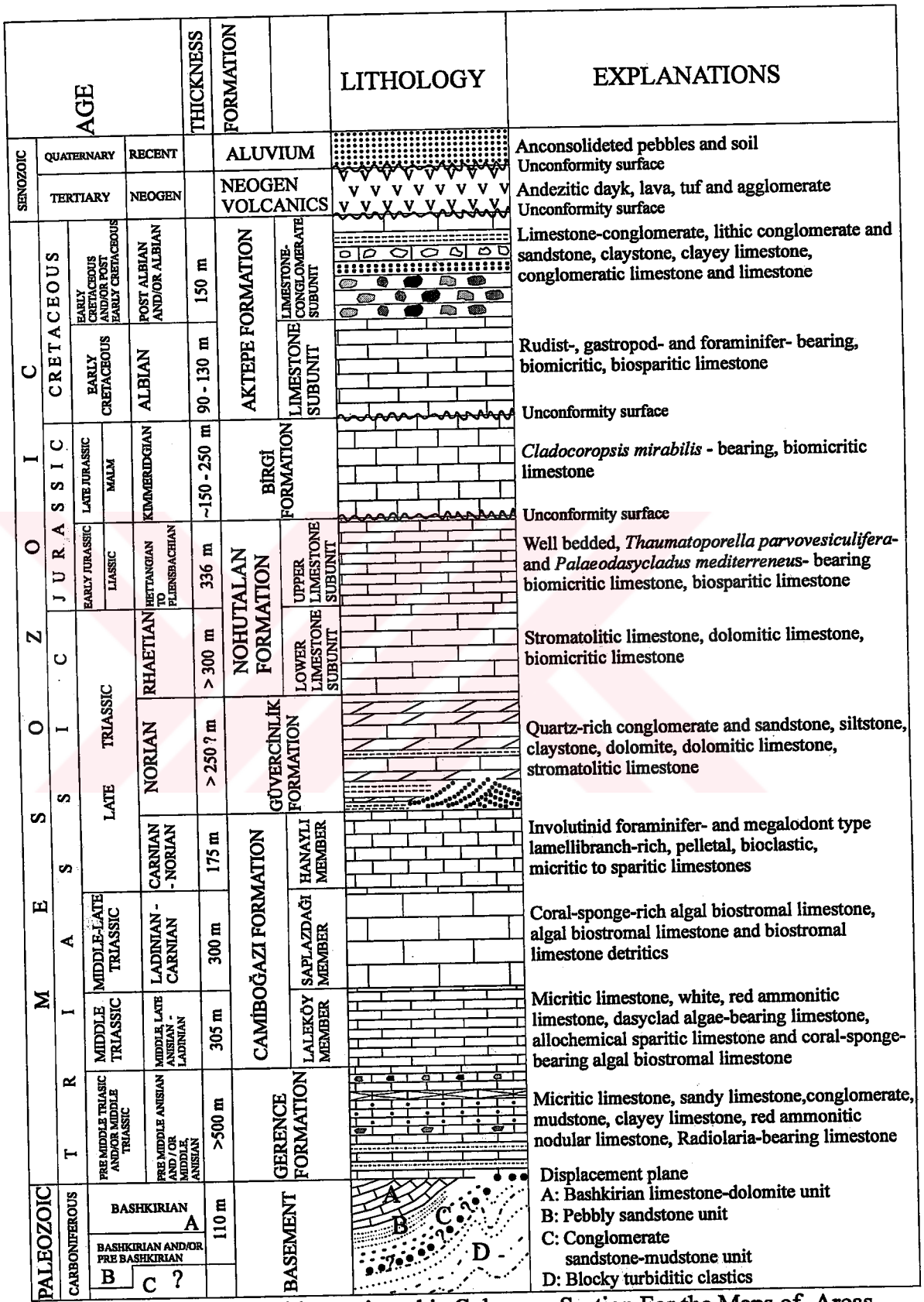


Figure 2. 1 Generalized Lithostratigraphic Columnar Section For the Maps of Areas.

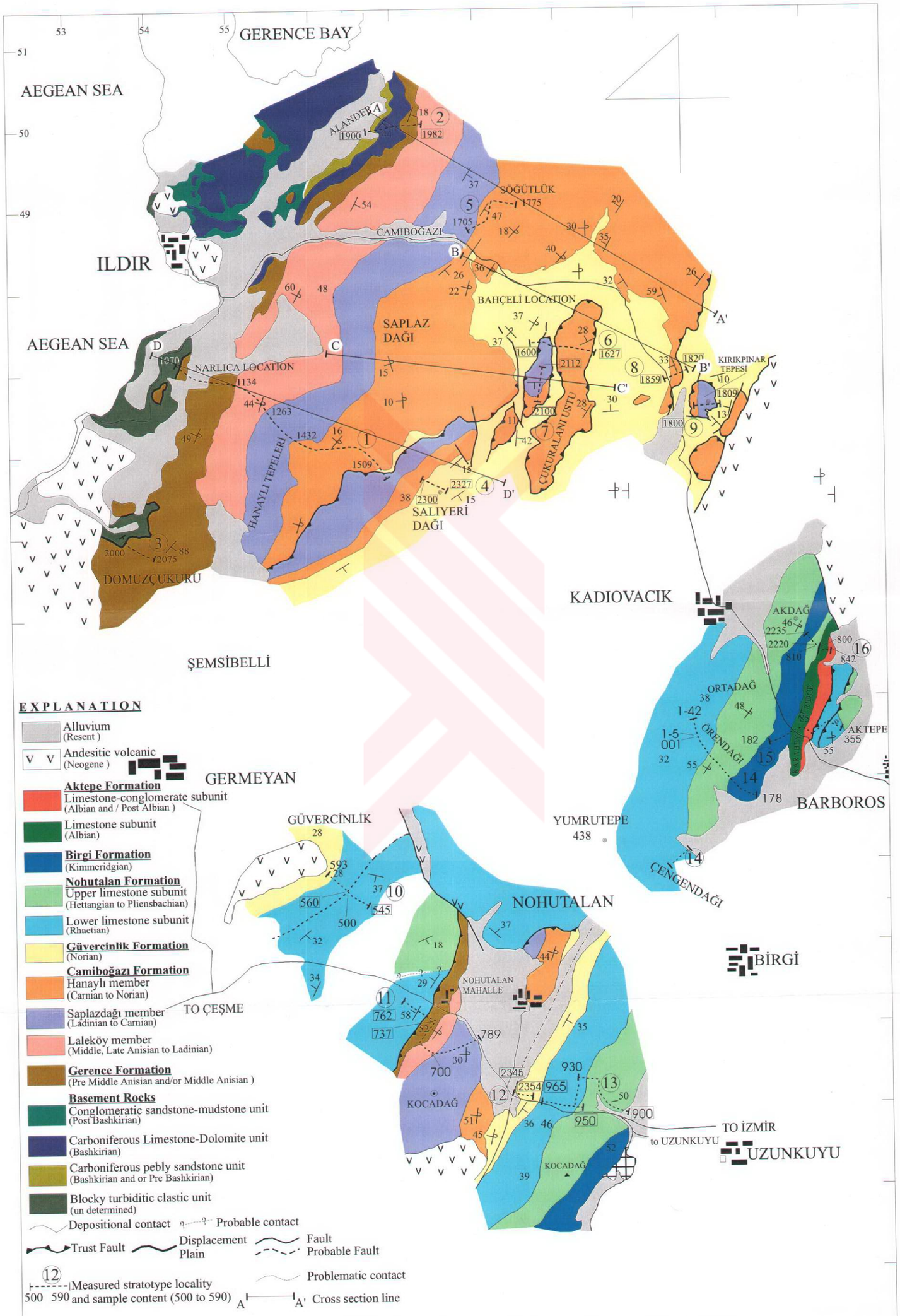


Figure 2.2a. Revised Distribution of The Rock Units in The Map Areas and Locations of the Stratotype sections.For cross sections, see Fig. 2. 2. b.

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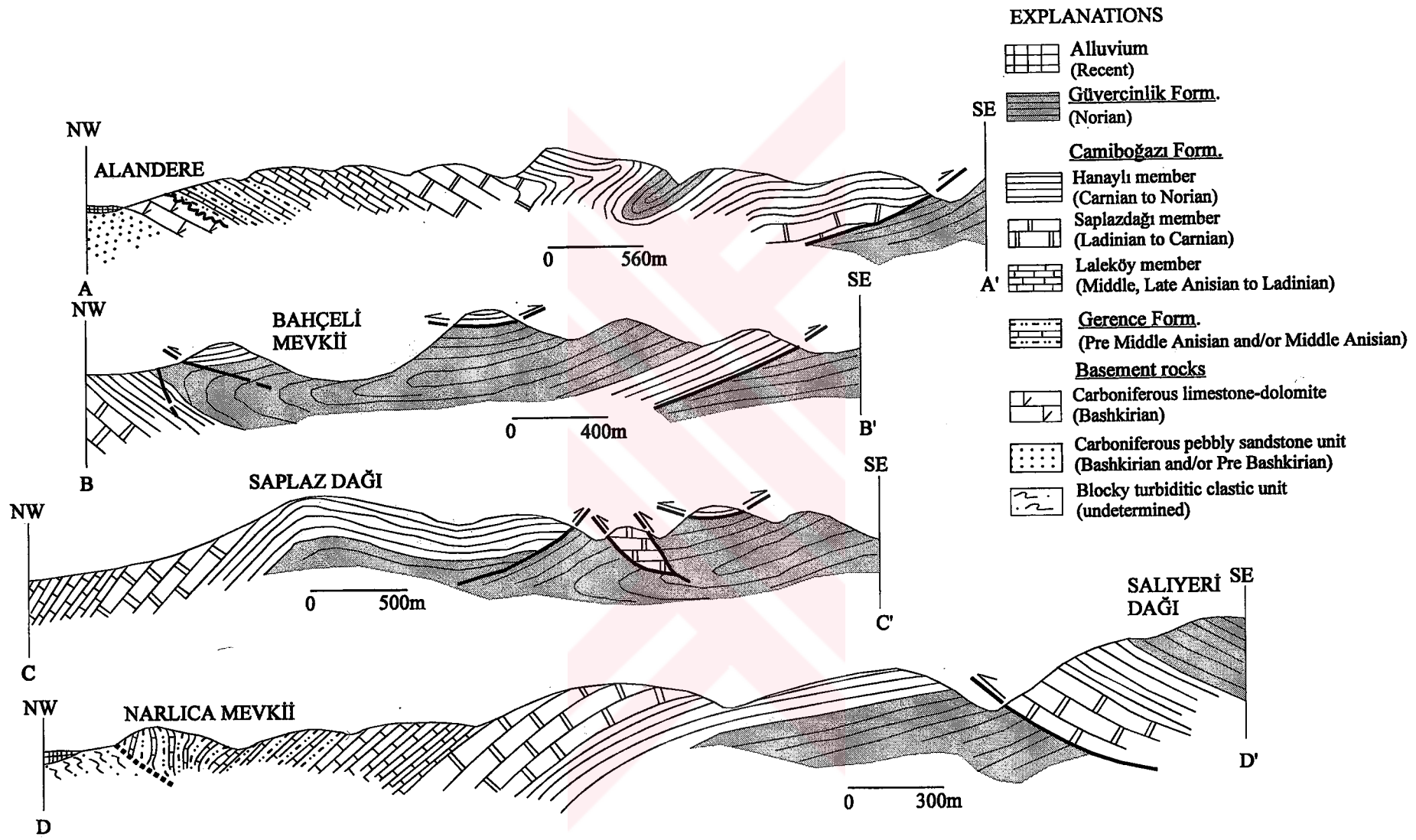


Figure2. 2b Cross Sections Showing Relations of the Rock Units in the Ildır Map Area.
Topographic Profile is Schematized and Vertically Exaggerated in all Sections. Section Lines are shown in Fig. 2. 2.

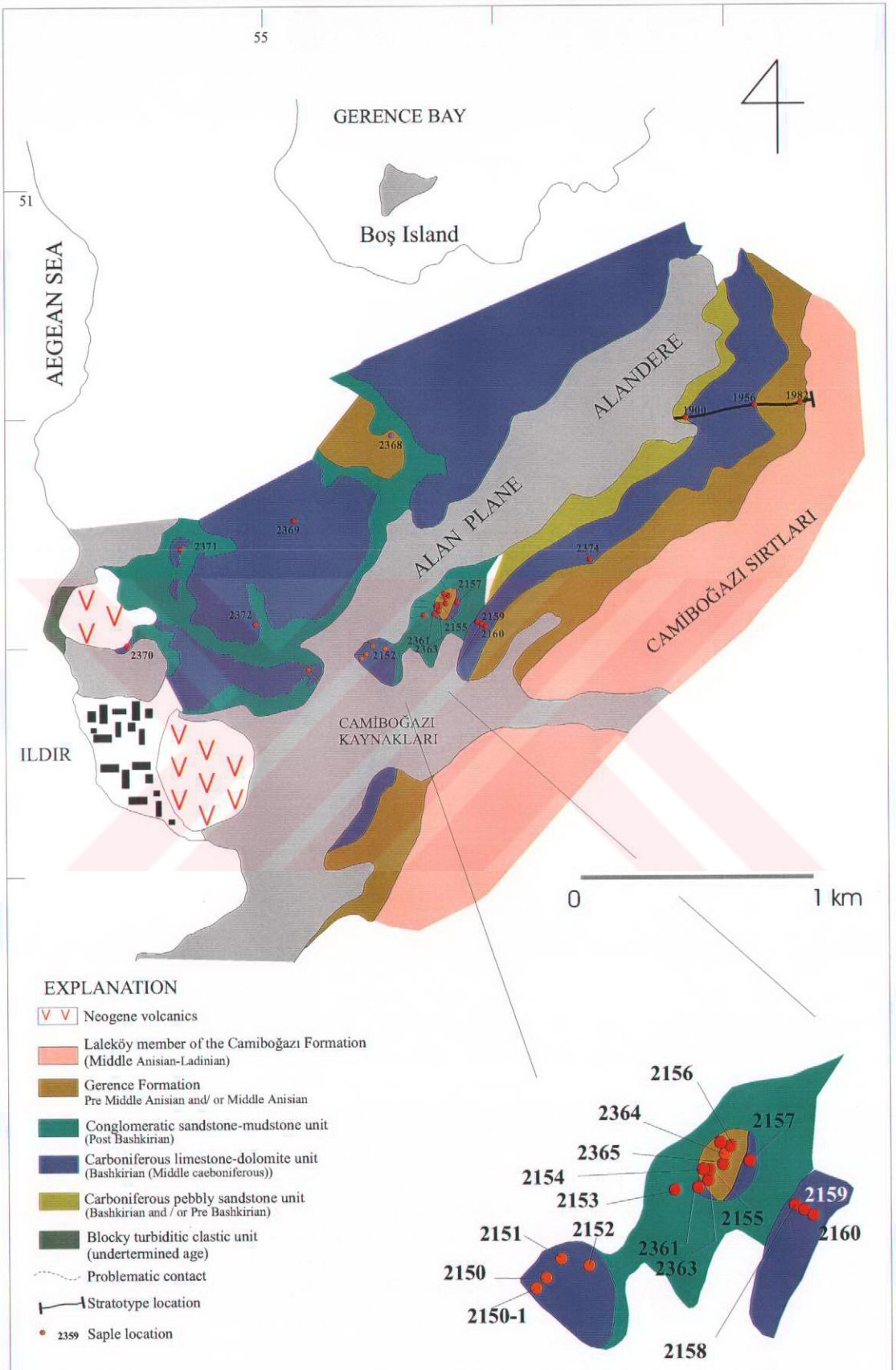


Figure 2. 3 Revised Distribution of Rock Units In the Alandere Map Area, Stratotype and Sample Location.

limestone and dolomites. In its measured stratotype (Figs. 2. 4 and 5), the lower part of the limestone consists of cemented algal-coral framestone including bryozoa, porifera, lamellibranchiata, brachiopoda, ostrocoda, crinoids fragment and benthic foraminifera. The recrystallized bioclastic limestones are made up of algal framestone with porifera, coral and rarely benthic foraminifers. The middle part of the stratotype is represented by alternating bioclastic wackestones, packstones and framestones. The wackestones includes rare benthic foraminifers and crinoidal fragments. The packstones are composed of abundant crinoidal fragments, lamellibranchiata, ostracoda, rarely benthic foraminifer and gastropods. The framestones are constituted by coral sponge and algal frame builders, and includes lamellibranchiata, ostracod, gastropod and benthic foraminifer. The section ends with a thick dolomite horizon.

The conglomeratic sandstone-mudstone unit consists of greenish gray turbiditic sandstone, conglomeratic sandstone, mudstone and shale. The unit locally includes intercalations of rounded black chert pebble-bearing conglomerates. Contact relationship between the conglomerate and sandstone-mudstone is not observed. The unit also includes some Bashkirian limestone detritus (~ 1m in diameter) which may reflect a post-Bashkirian age for the unit.

In the Alan Plane, at the 400 m north of the Ildır village, two block-like limestone masses approximately 100 m in size occur in the conglomeratic sandstone mudstone unit. One of the limestone masses is Bashkirian in age. The other one comprises Bashkirian and Anisian parts.

Blocky-turbiditic clastic unit consists of mainly green turbiditic sandstone, grenish grey silstone and mudstone, black chert (ribbon radiolarite, lydith) including Silurian, Lower Devonian and Lower Carboniferous radiolaria (Kozur, 1995), angular black ribbon chert conglomerate, volcanic clasts and angular to subrounded sandstone, siltstone, chert, quarzite, volcanoclast-bearing fine-grained lithic conglomerate layers and/or blocks. No age data is available for the unit.

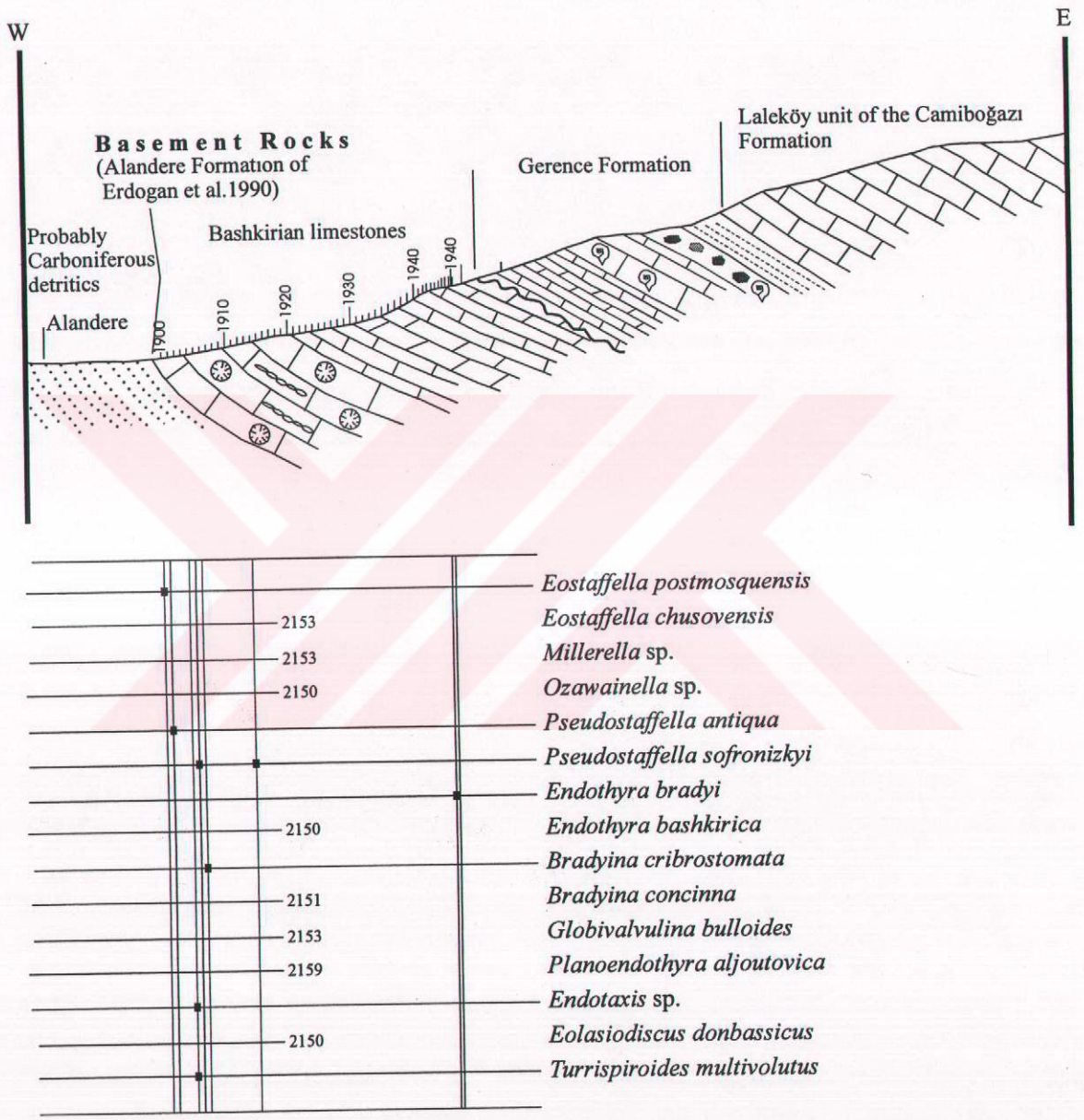
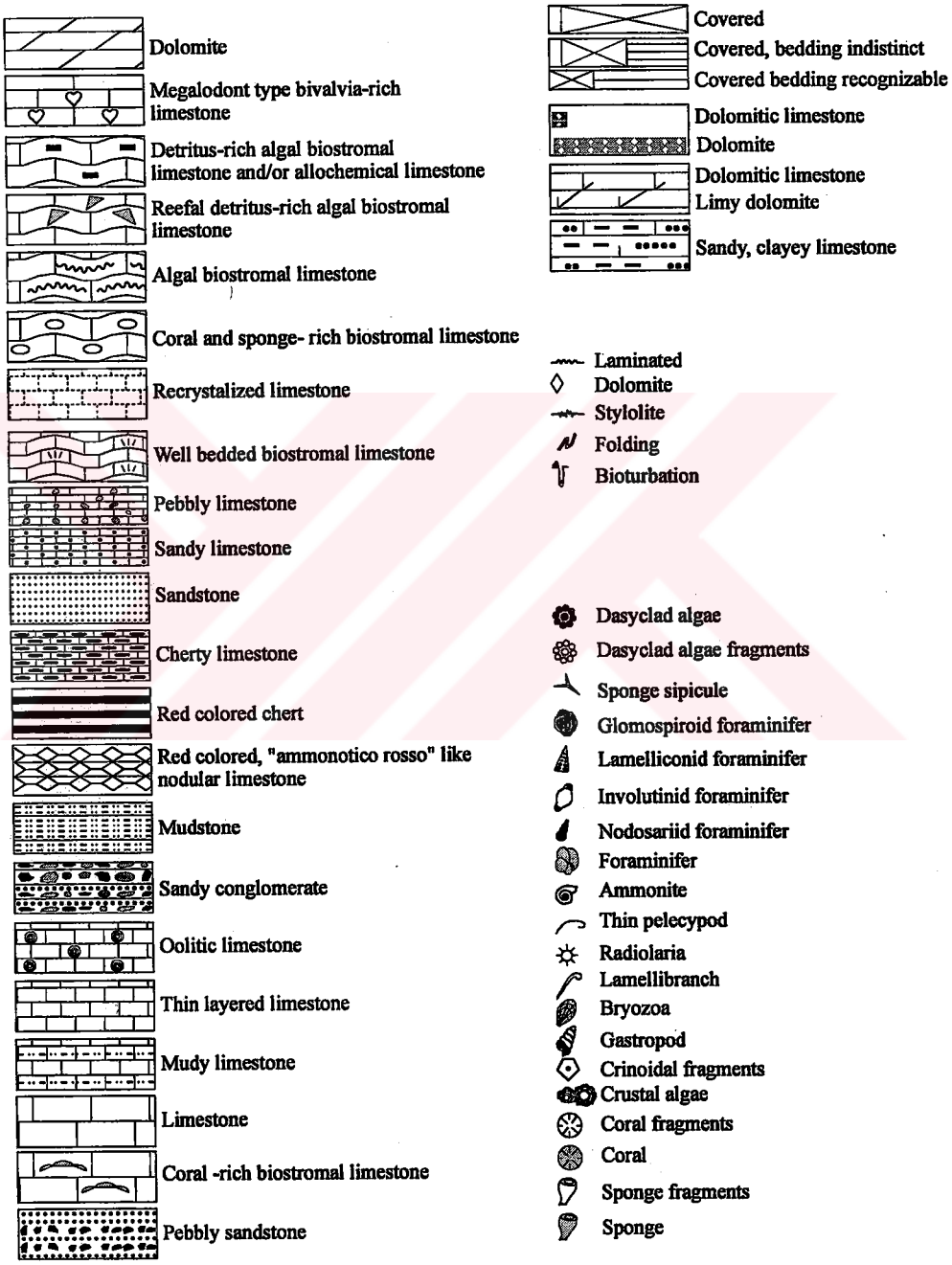


Figure 2. 4 Cross-section of the Alandere Stratotype Section (Stratotype no. 2) and Foraminifera Content of the Carboniferous Limestone- Dolomite unit.

Explanations for figures 2. 5, 8, 9, 12, 14, 16, 17, and 2. 19



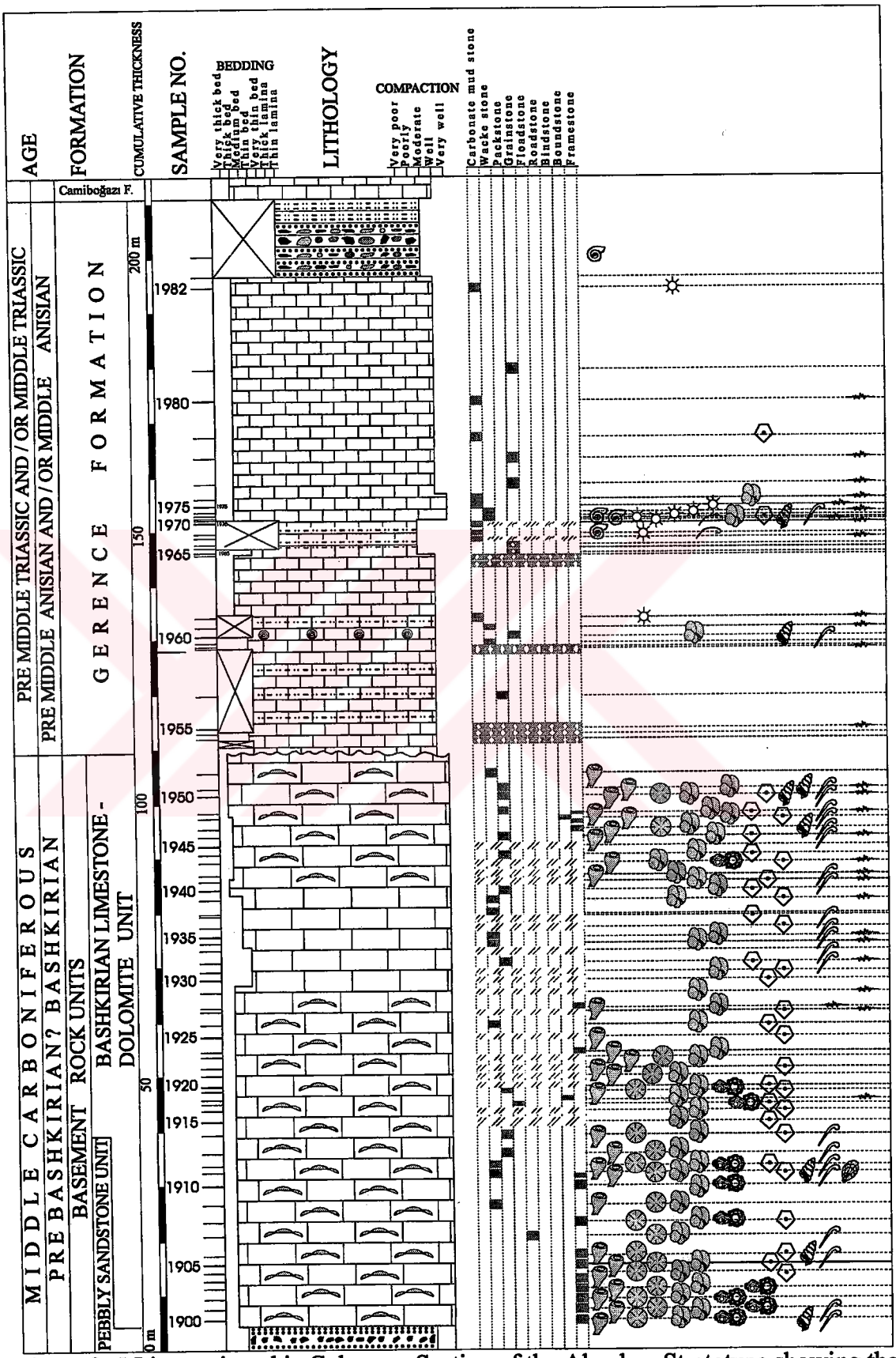


Figure 2. 5 Litostratigraphic Colomnar Section of the Alandere Stratotype showing the Contact Between the Bashkirian Limestone-Dolomite unit and Gerence Formation (Stratotype n. 2).

2. 1. 3. Contact relations: The Carboniferous pebbly-sandstone unit is conformably overlain by the locally dolomitized limestone of Carboniferous (Bashkirian) age. The apparent conformity suggests a Carboniferous age for the Carboniferous pebbly-sandstone unit (Figs.2. 4 and 5).

The Carboniferous (Bashkirian) limestone unit is unconformably overlain by the pre-Middle Anisian, Late Anisian and/or Middle, Late Anisian Gerence Formation. The exposures are located to the northeast and east of the Ildır Village, along the Camiboğazı Sırtı (Figs. 2. 4 and 5) and on the Ildır–Kadıovacık road, and near the Camiboğazı springs respectively. Thinly to medium-bedded micritic, cherty limestone and radiolaria and pelecypod-bearing limestone directly rest on the Carboniferous (Bashkirian) neritic limestone. In both localities, the contact seems to be an unconformity. However, a basal conglomerate, paleosol or an oxidizing zone, which can be related to a subaerial unconformity are not present in the contact.

The conglomeratic sandstone-mudstone unit is overlain by the Bashkirian limestone through an abrupt contact, in the southeast and west sides of the Alan Plane. To the western side of the Alan Plane the Conglomeratic sandstone-mudstone unit presents some injection like uplifting structures into the Bashkirian limestone. The Bashkirian clastics which reflect a post-Bashkirian age for the unit may also imply the overlying Bashkirian succession to be a block in the Conglomeratic sandstone mudstone unit.

Similarly, the Conglomeratic sandstone-mudstone unit does not exhibit a gradational change to the apparently overlying two block-like limestone masses. In the case of a block interpretation, the Bashkirian-Anisian limestone mass suggests an Anisian and/or post Anisian or younger age for the Conglomeratic sandstone-mudstone unit.

On the other hand, all these blocky nature of mentioned rocks could be related with a post-Bashkirian unconformity, covered by the Middle Triassic (Anisian)

rocks. But it is difficult to support this interpretation with present level of field constraints.

The contact between the conglomeratic sandstone-mudstone and the blocky-turbiditic clastic unit is not exposed. The Conglomeratic sandstone-mudstone unit can be distinguished from the blocky turbiditic clastic unit, only by the absence of black ribbon chert blocks, however with less blocky nature. They might be belonging to the same unit, or the Conglomeratic sandstone-mudstone unit occurs as blocks in the Blocky-turbiditic clastic unit.

In the Alandere locality, although the contact is not well exposed, the blocky-turbiditic clastic unit seems to underlie or envelope the Carboniferous (Bashkirian) limestones. The unit also includes some Bashkirian limestone blocks which may indicate a Post-Bashkirian age for the unit. It is also possible to interpret the overlying Bashkirian limestone as a block within the Blocky turbiditic clastic unit. On the other hand, in the Narlıcak and Domuzcukuru localities (Figs. 2. 2a, b, 2. 6) the Blocky turbiditic clastic unit is overlain by the different horizons of the pre-Middle Anisian, Late Anisian and/or Middle and Late Anisian Gerence Formation. In the Narlıcak locality, the contact is completely covered. In the Domuzcukuru locality, different horizons of the Gerence Formation directly rest on the Blocky-turbiditic clastic unit. The contact may be interpreted as a plane of displacement.

2. 1. 5. Age: Only the Carboniferous limestone-dolomite unit and some block-like limestone masses contain age diagnostic foraminifers. The limestones includes a foraminiferal assemblage consisting of *Eostaffella postmosquensis*, *E. chusovensis*, *E. pseudostruvei chomatifera*, *Eostaffella* spp., *Plectostaffella varvariensis*, *Millerella angusta*, *Millerella* sp., *Pseudoendothyra* sp., *Ozawainella* sp., *Pseudostafella antiqua*, *P. sofronizkyi*, *Pseudostaffella* sp., *Endothyra bashkirica*, *E. bradyi*, *E. bradyi minima*, *Endothyra* sp., *Planoendothyra aljoutovica*, *P. spirilliniformis*, *Bradyina cribrostomata*, *B. concinna*, *Globivalvulina kamensis*, *G. bulloides*, *Globivalvulina* sp., *Climacammina* sp., *Paleotextularia* sp., *Endotaxis* sp., *Tetrataxis* spp., *Turrispiroides multivolutus*, *Eolasiodiscus compactus*, *E.*

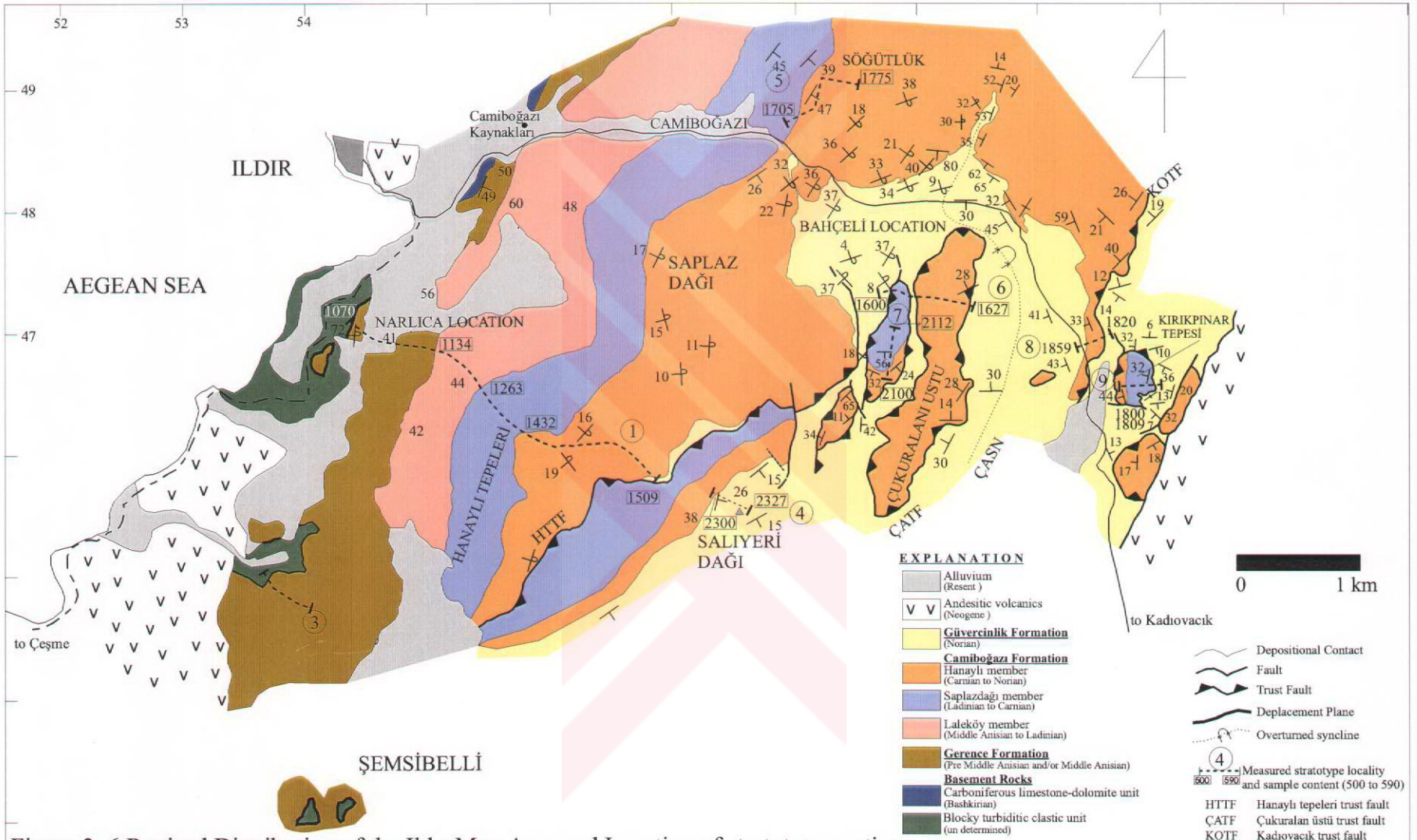


Figure 2. 6 Revised Distribution of the Ildır Map Area and Location of stratotype sections.

donbassicus, *Asteroarchaediscus* sp., *Neoarchaediscus* sp., *Paleonubecularia* sp. The above foraminiferal fauna is identified and interpreted by Prof. Dr. Demir Altıner (METU, Ankara). It belongs to *Pseudostaffella antiqua* Zone which can be attributed to the Akavasky to Askynbashsky horizons of the Bashkirian stage of the former USSR (Fig. 2. 4).

2. 1. 4. Remarks: In the Narlıcak and Domuzçukuru locations, the basement units were described by Brinkmann et al. (1972) as Devonian to Early Carboniferous (Visean) "graywacke" and "Kohlenkalke". In the Ildır location, the above lithic assemblage was distinguished as the Devonian to Early Carboniferous "Yaylagrovak unit". Both the neritic and dolomitic limestones were divided by Gümüş (1971) into the Early Carboniferous Tınaztepe and Alandere units. Erdoğan et al. (1990) named the basement rocks as the Early-Middle Carboniferous (Bashkirian) Alandere Formation. In the Ildır location, some parts of the clastic rocks which were considered as the "Basement rocks" without referring to any age, were accepted as a part of the Triassic Gerence Formation. Robertson & Pickett (2000) interpreted that the clastic and Carboniferous carbonate units in the Alandere location represent the "Karaburun melange". Some turbiditic shale and sandstones parts of the melange consists matrix of the melange.

2. 2. GERENCE FORMATION

2. 2. 1. Description: The Gerence Formation consists of alternating thin to thick-bedded greyish limestone and laminated to thin-bedded yellowish green calcareous mudstone, reddish ammonitic limestone, brownish oolitic limestone, green to red chert, yellowish green calcareous sandstone and greyish intraformational conglomerate intercalations.

The stratotype section of the Formation is exposed in the Narlıcak locality, 2 km south, southeast of the Ildır village (Fig. 2, 6). The Formation is also exposed in the Domuzçukuru, Alandere and Nohutalan Mahalle localities (Figs. 2. 6 and 7). The Domuzçukuru partial type section is situated in the Domuzçukuru locality, to the 6

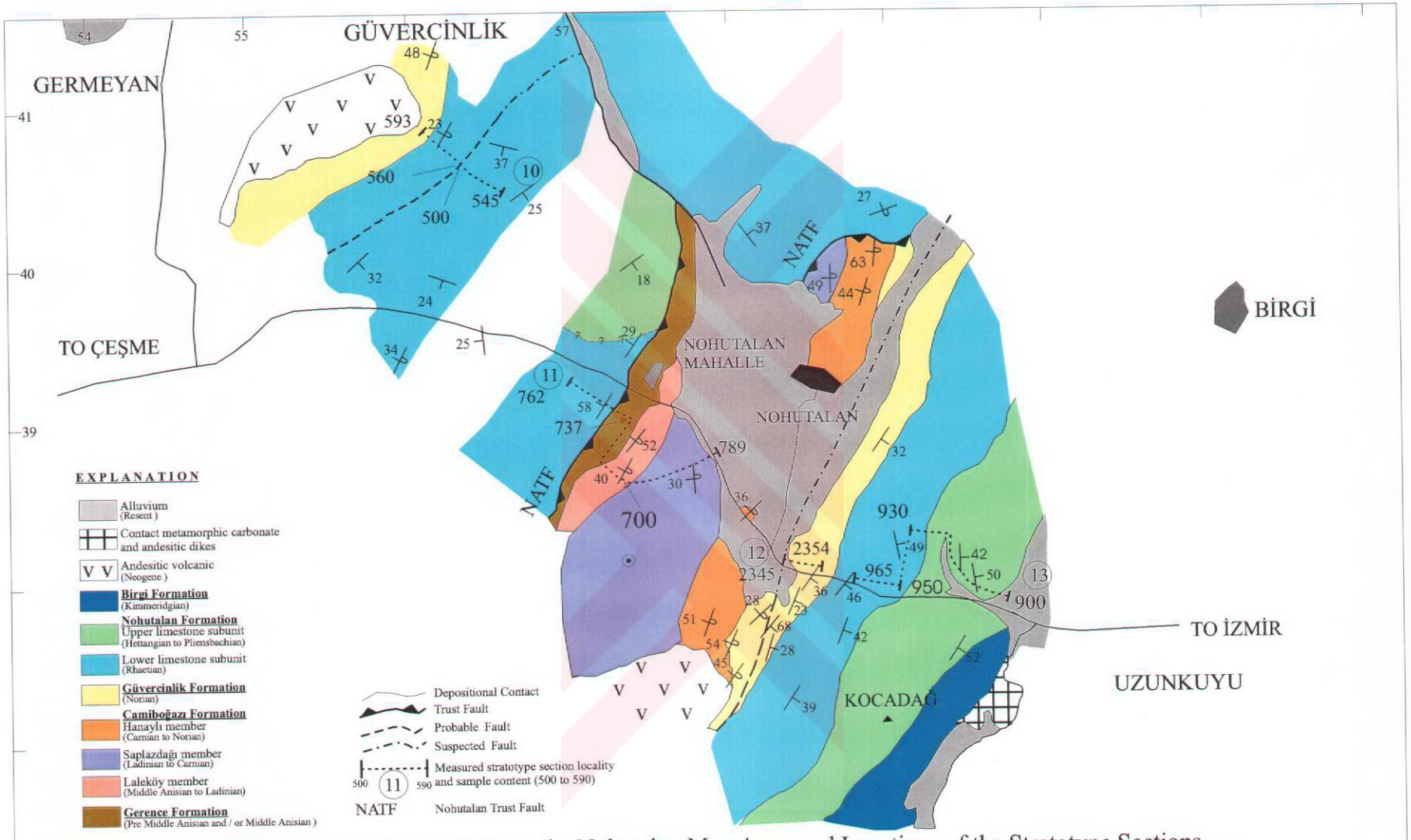


Figure 2. 7 Revised Distribution of Rock Units In the Nohutalan Map Area, and Locations of the Stratotype Sections.

km south of the Ildır Village. The Alandere and Nohutalan Mahalle partial type sections are located in the Alandere locality, to the 1 km northeast of the Ildır Village and to the 100 m south of the Nohutalan Mahalle, respectively.

2. 2. 2. Lithology: In the Narlıca stratotype section (Figs. 2. 6, 7 and 8), the Alandere, Domuzcukuru and Nohutalan Mahalle partial type-sections (Figs. 2. 8, 9 and 10), in ascending order, the formation is divisible into intercalating horiozons i) grey to dark grey micritic limestone, ii) clayey and muddy limestone, iii) red, nodular ammonitic limestone iv) reddish grey oolitic limestone, v) red chert, vi) brown to grey intraformational conglomerate, vii) reddish cherty limestone, viii) yellowish calcareous sandstone, ix) grey sandy limestone, x) light grey mudstone and xi) grey intraformational conglomerate.

i) The grey to dark grey micritic limestone is thin to medium-bedded, well indurated and consists of carbonate mudstone and bioclastic wackestone including radiolaria and thin pelecypod.

ii) The clayey and muddy limestone is grey to greenish grey, thin to medium-bedded and moderately indurated. Very local carbonate-rich intercalations of the horizon contains fine biodetritic, pelletal packstone with crustal-algae and foraminifers.

iii) The red nodular ammonitic limestone is medium to thick-bedded (50-100 cm) and well to moderately indurated. It consists of nodular, clayey carbonate mudstone and floatstone including abundant ammonite and radiolaria.

iv) The reddish grey oolitic limestone consists of thick-bedded (50-100 cm), well indurated oolitic grainstone and oolitic rudstone which are very well sorted and with rounded bioclasts. Texture is grain-supported and carbonate (dolomitic and /or calcitic) cemented. Ooliths have coarse bioclastic and rarely lithic cores and are constituted by a few enveloping laminae.

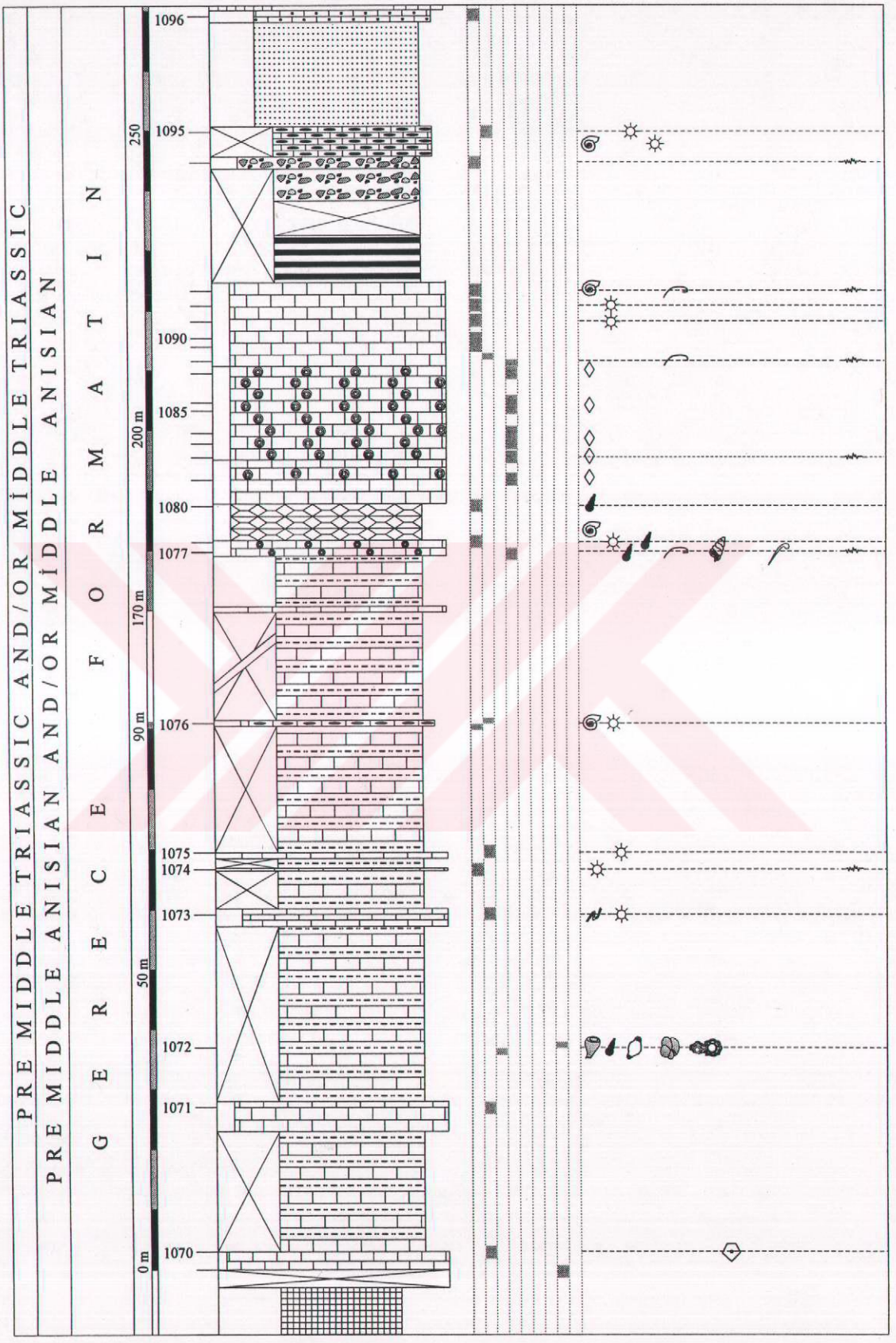
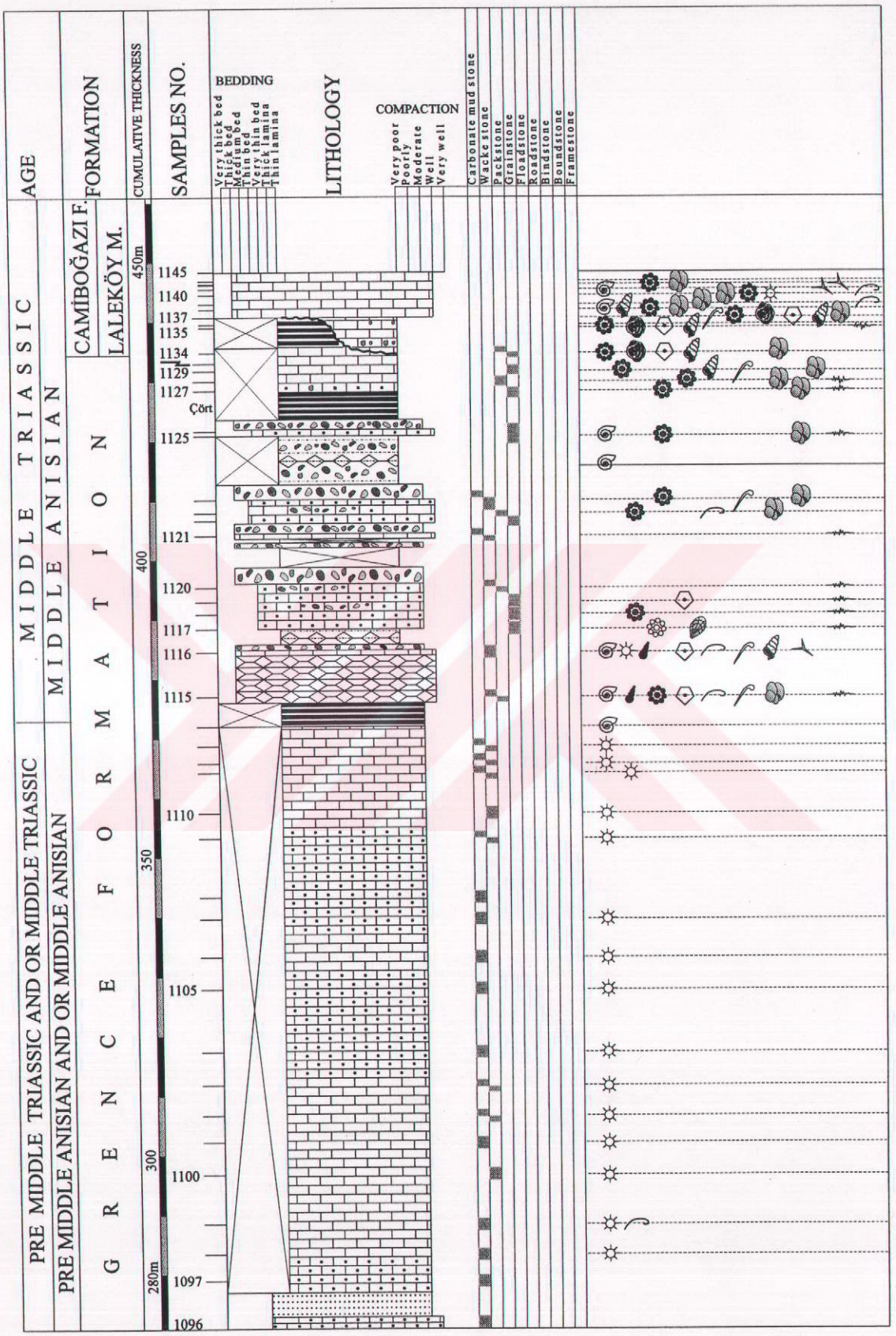


Figure 2. 8 Litostratigraphic Columnar Section of the Gerence Formation in the Narlıca Stratotype section (Stratotype no. 1).


AGE
FORMATION
CUMULATIVE THICKNESS
SAMPLES NO.
BEDDING
LITHOLOGY
COMPACTION
PRE MIDDLE TRIASSIC AND OR MIDDLE TRIASSIC
MIDDLE TRIASSIC
PRE MIDDLE ANISIAN AND OR MIDDLE ANISIAN
MIDDLE ANISIAN
CAMİBOĞAZI F.
LALEKÖY M.
GRENCE FORMATION
450m
400
350
300
280m
1145
1140
1137
1135
1134
1129
1127
Çört
1125
1121
1120
1117
1116
1115
1110
1105
1100
1097
1096
Very thick bed
Thick bed
Medium bed
Thin bed
Very thin bed
Thick lamina
Thin lamina
Very poor
Poorly
Moderate
Well
Very well
Carbonate mud stone
Wacke stone
Packstone
Grainstone
Floadstone
Roadstone
Bindstone
Boundstone
Framestone

Continued.

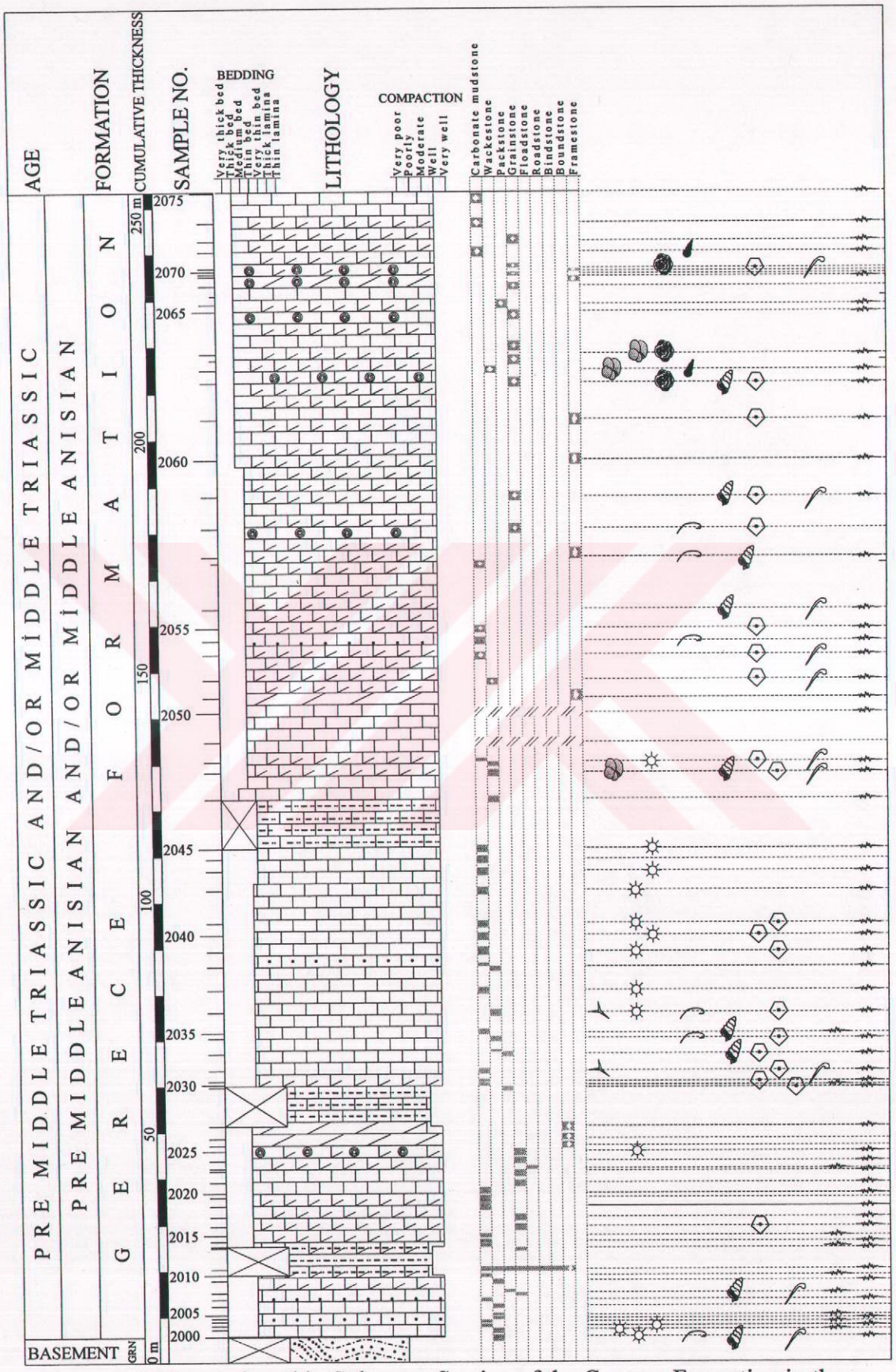


Figure 2. 9 Litostratigraphic Columnar Section of the Gerence Formation in the Domuzçukuru Stratotype Section (Stratotype no. 3).

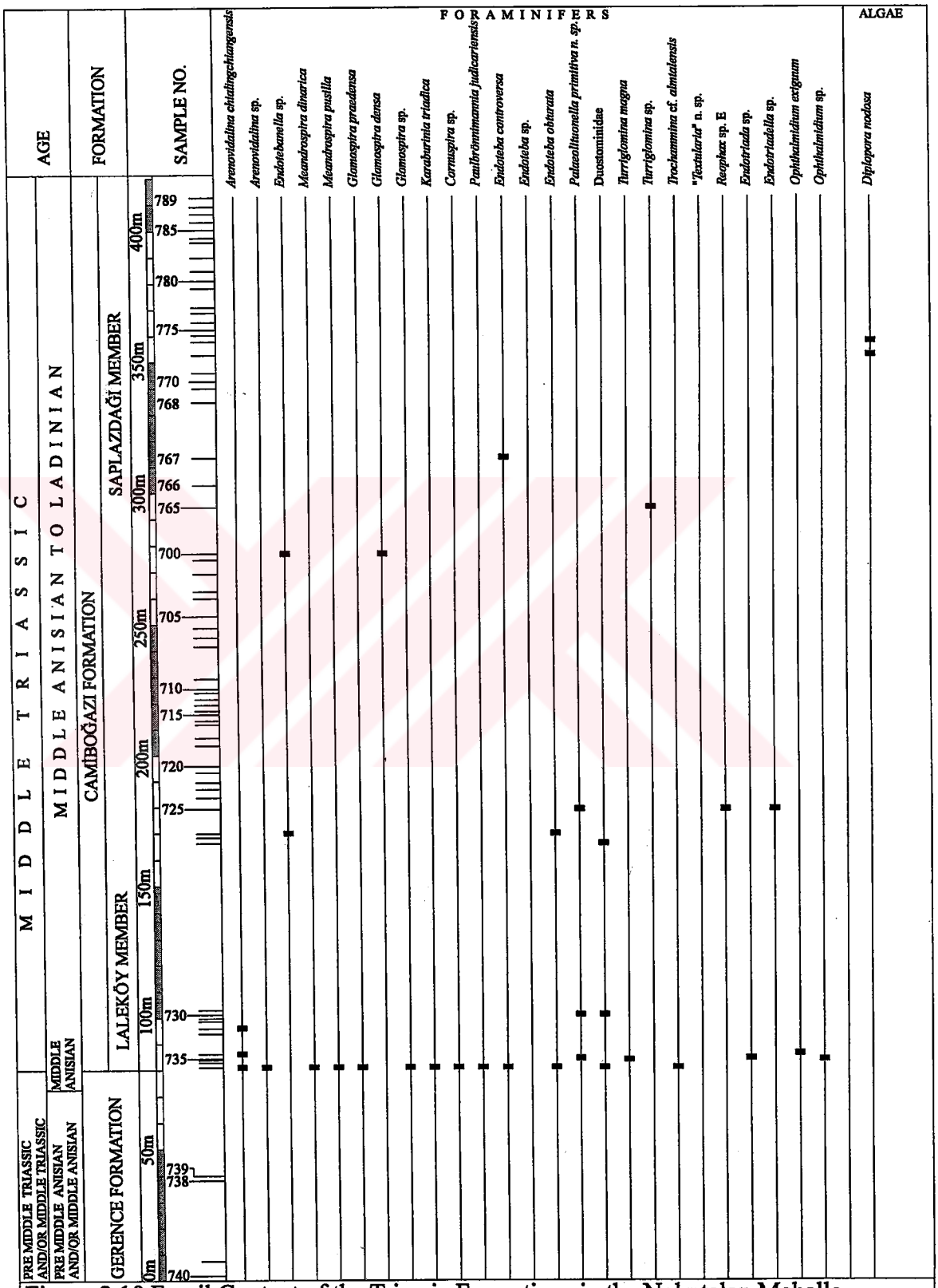


Figure 2.10 Fossil Content of the Triassic Formations in the Nohutalan Mahalle Stratotype Section (Stratotype no. 11).

v) The red chert is very thin to thin-bedded (110 cm), well indurated and contain radiolaria. From base to top, four red chert layers occur in the Gerence Formation. The thickness of the chert layers ranges from 3 to 6 m.

vi) The brown to grey intraformational conglomerate is of medium to thick-bedded (20 to 100 cm), well indurated, poorly sorted and medium to coarse-grained. The limestone pebbles are angular and elongated, reflecting an intraformational origin. In the Narlıcak type-section, average grain size varies from 2 to 9 cm. In the Nohutalan Mahalle partial type-section, maximum grain size reaches about 4-5 cm. This layer is laterally continuous and in the Narlıcak and Norutalan Mahalle type-sections, in the Halkapınar valley, 2 km northwest of the Germeyan village. Elsewhere it is laterally discontinuous.

vii) The reddish cherty limestone consists of thin-bedded, well indurated, cherty microcrystalline limestone with abundant radiolaria and rare thin pelecypod filament.

viii) The yellowish calcareous sandstone is thin to medium-bedded, moderately to well indurated, calcareous and lithic in composition. It may change laterally into claystones, mudstones or calcareous mudrocks.

ix) The grey sandy limestone is thin to medium-bedded (1 to 20 cm), well indurated, microcrystalline and comprises radiolaria, rare ammonit and thin pelecypod filament, minor sand to silt-sized quartz grains. The sandy limestone horizon locally intercalates with calcareous laminated mudrocks.

x) The light grey mudstone is laminated to thin-bedded, poorly indurated, locally calcareous, and bears brachiopod and lamellibranch relicts.

xi) The grey intraformational conglomerate is medium to thick-bedded and well to moderately indurated. It consists commonly of limestone, rarely green sandstone, red and white chert pebbles. The limestone pebbles are dark grey to grey, brown, light brown, pinkish and red in colour. They seem to have derived from different older

horizons of the Gerence formation. Maximum grain size is 15 cm. Average grain size varies from 1 cm to 8 cm. Pebbles are generally angular to subrounded and poorly-sorted. Well rounded pebbles also occur. Fine-grained laterally discontinuous limestone conglomerate and limestone sandstone with micritic matrix are common. The intraformational conglomerate is exposed in the Alandere, Narlıcak and Manastır localities.

2. 2. 3. Contact relations: In the Alandere location, along the Camiboğazı Sırtı (Figs. 2. 4 and 5) and on the Ildır-Kadıovacık road, near the Camiboğazi spring, the Gerence Formation rests on the Carboniferous (Bashkirian) limestones. On the other hand, to the west of the Narlıcak and Domuzçukuru locations, the formation overlies The Blocky-turbiditic clastic unit of Basement rocks through an abrubt contact.

The Formation is conformably overlain by the Laleköy unit of the Camiboğazı Formation. The contact is defined by the occurrences of local sporadic hiatuses and depending on different competencies of mudstone layers of the Gerence Formation and the Laleköy unit.

2. 2. 5. Age: In the Narlıcak type section (Fig. 2. 11), the lowermost part of Gerence Formation includes *Arenovidalina amylovoluta*, *Arenovidalina chialingchiangensis*, *Arenovidalina* sp., *Triadodiscus eomesozoicus*, *Endotebanella* sp., Nodosariidae and Duostominidae foraminifers. The middle part of the type section is devoid of foraminifer and algae. A red limestone layer which includes poorly preserved ammonite, and a thick, thin-bedded limestone layer which contains abundant radiolaria were not investigated in this study. The upper part of the Formation is represented by a foraminiferal assemblage composed of *Meandrospira cheni* ?, *M. dinarica*, *Glomosipira densa*, *Glomospirella grandis*, *Glomogallerium mlavicencis*, *Karaburinia* ? sp., *Ophthalmidium tricki*, *Arenovidalina amylovoluta*, *Arenovidalina chialingchiangensis*, Nodosariidae, Duostominidae, *Ophthalmidium exiguum*, *Turrispirillina* sp., *Endoteba controversa*, *E.* ex gr. *obturata*, *Endotebanella pentacamerata*, *Endotebanella* sp. A, *Trochammina* cf. *almtalensis*,

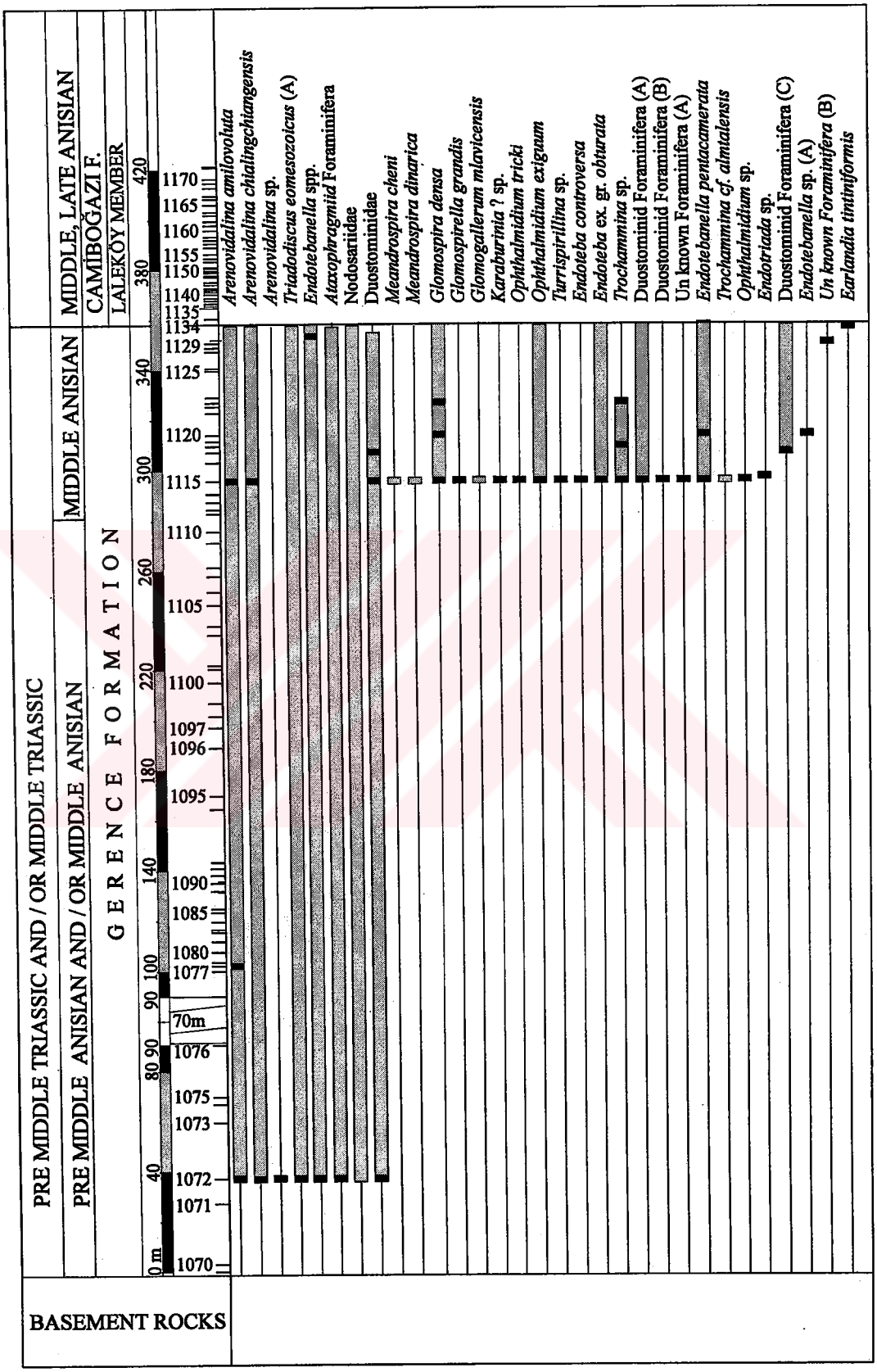


Figure 2. 11 Startigraphic Distribution of the Foraminifers in the Gerence Formation

Endotriada sp., *Trochammina* sp., *Earlandia tintiniformis*, Duostominid Foraminifera A, B and C, Unknown Foraminifera A and B.

In the Domuzçukuru Partial stratotype section, the middle part of the formation includes *Meandrospira pusilla*, *Glomosipira* cf. *praedensa* and *Endoteba* sp.

Glomospira praedensa indicates a Scyhtian age (Rettori et al. 1995). *Meandrospira pusilla* is characteristic for a Late Scyhtian to Pelsonian (middle Anisian) time interval, such as Late Scythian-Anisian (Zaninetti, 1976; Altıner & Kocyiğit, 1993), Late-Early Scythian to Pelsonian (Rettori et al, 1995). The age of the *G. praedensa* can be extended into Scyhtian to Middle Anisian. So the age of the lower and middle part of the Gerence Formation, which comprises *Meandrospira pusilla* and *Glomospira praedensa,* is suggested to be Pre-Middle Anisian and / or Middle Anisian. In the upper part of the formation the existence of the Scythian-Middle Anisian *Meandrospira pusilla*, Early to Middle Anisian *M. dinarica* (Rettori, 1995) and (Early ?) Middle to Late Anisian *Glomospira densa* (Rettori, 1995; Altıner & Kocyiğit, 1993) indicates a Middle, Late Anisian age. Also the existence of *Glomogallerum mlavicensis* (Urosevic, 1995) in the uppermost Scythian-Lower Anisian supports the given age.

2. 2. 4. Remarks: The Gerence Formation of Erdoğan et al., (1990) corresponds to the Domuzcukuru, Koyutepe and Laleköy Formatıon of the Brinkmann et al. (1972).

In this study, the Gerence Formation corresponds to the Domuzçukuru and Koyutepe formations of the Brinkmann et al. (1972). These lithologically heterogeneous formations of Brinkmann et al., (1972) can not be distinguished from each other because of the lithologic similarities and repetitions. On the other hand, on the contrary of Erdoğan et al. (1990), the Laleköy Formation of the Brinkmann et al., (1972) consisting entirely of limestones, cannot be considered as a part of the Gerence Formation. The ammonitic reddish limestone of the Laleköy Formation of Brinkmann et al. (1972) is not lithologically similar to the red, nodular ammonitic

layers of the Domuzçukuru and Koyutepe formations and also the Laleköy Formation of the Brinkmann et al., (1972) which includes more than 150 m thick grayish, intraclastic, pelletal allochemical limestone and sponge-bearing algal biostromal limestone.

2. 3. CAMİBOĞAZI FORMATION

The Camiboğazı Formation is characterized by a continuous limestone sequence consisting of different type of limestones such as dasyclad algae-rich limestone, ammonitic limestone, Radiolaria-rich limestone, coral and sponge or crustal algae-rich, algal biostromal limestone and megalodont-type bivalvia-bearing micritic and sparitic limestone. The Formation is bounded by detritus-rich Gerence and detritus and dolomite-rich Güvercinlik Formations at the base and the top, respectively. From base to top, the formation is divisible into the Laleköy, the Saplazdağı and the Hanaylı members. The Formation is widely exposed in the Camiboğazı spring, in Saplazdağı and to the north of the Narlıcak location (Fig. 2. 6).

2. 3. 1. Remarks: The "Camiboğazı Formation" consists of thick bedded to massive reefal and lagoonal limestone (Brinkmann et al., 1972). Erdoğan et al., 1990 in apparent agreement with Brinkmann et al., (1972), inserted the Laleköy Formation of Brinkmann et al. (1972), to the Camiboğazı Formation. In this study, the name Camiboğazı Formation corresponds to the integrated assemblage of the Laleköy, Camiboğazı and Hanaylı formations of Brinkmann et al. (1972).

2. 3. 2. Laleköy member

2. 3. 2. 1. Description: The Laleköy member consists of medium to thick-bedded, massive, reddish brown dasyclad algae-rich limestone; reddish brown, red and white ammonitic limestone; light grey arenitic limestone; light grey Radiolaria-rich limestone and coral and sponge or crustal algae-rich, coral and sponge-bearing algal biostromal limestone. The member is widely exposed in the Narlıca location, and to the west of Saplazdağı and in Zeytincik area.

T.C. YÜKSEKÖĞRETİM KURULU
DOKÜMANTASYON MERKEZİ

2. 3. 2. 2. Lithology: In the Narlıca stratotype section (Fig. 2. 12), the member is divided into successive stratigraphic horizons.

1. Horizon consists of 1-2 m thick, reddish brown, well compacted, medium-bedded dasyclad algae-rich limestone, consisting of bioclastic wackestone and floadstone, which comprise foraminifer, gastropod and crinoidal clasts.

2. Horizon consists of brownish, fine-grained conglomerate and sandy limestone which is made up of bioclastic wackestone and packstone. It includes dasyclad algae, foraminifer, thin filament, gastropod and crinoidal fragments. The 1. and 2. horizons are not laterally continuous. They occur in the Narlıca and Şemsibelli (İşintek et al., 2000) stratotypes, however they are absent in the Nohutalan Mahalle stratotype.

3. Horizon consists of approximately 8 meter thick, light grey, reddishpink to white, well compacted, laminated to thick-bedded, ammonite-rich limestone which comprises the same bioclastic wackestone in the older horizons. The ammonite-rich bioclastic wackestone is characterized by thin filaments of bivalves and spicules of sponges.

4. Horizon, consists of 7-8 metre thick assemblage of wackestone, pebbly, dasyclad algae-rich grainstone and floatstone, which contain foraminifers, lamellibranchs, gastropods and crinoids fragments.

5. Horizon consists of 10 meter thick, reddish to light grey, ammonite-rich limestone including bioclastic wackestone and fine-grained bioclastic grainstone. The common allochemes are dasyclad algae, gastropods, lamellibranchs, crinoids, and thin filaments of bivalvia.

6. Horizon consists approximately of 75 meter thick, light grey to grey, well indurated, medium-bedded to laminated limestone. The limestone includes intraclastic, bioclastic and pelletal grainstone, and alternating intraclastic, bioclastic and pelletal grainstone, pelletal wackestone and pelletal carbonate mudstone. The rare dasyclad algae, abundant crinoidal fragments, foraminifer and rare involutinid foraminifers, gastropod and lamellibranch fragments and thin filaments are the common components of the bioclasts. Coral and sponge fragments are rare components.

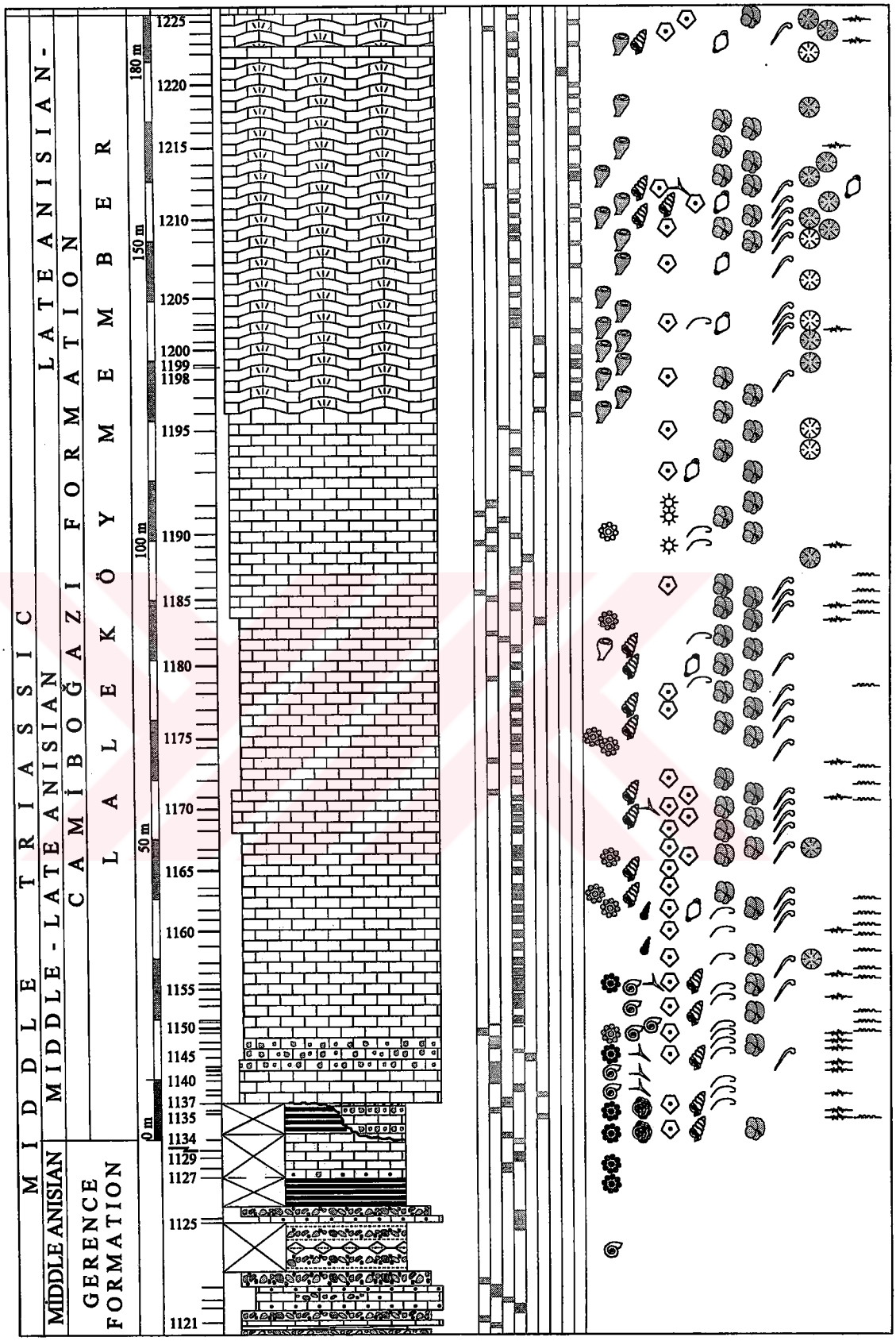
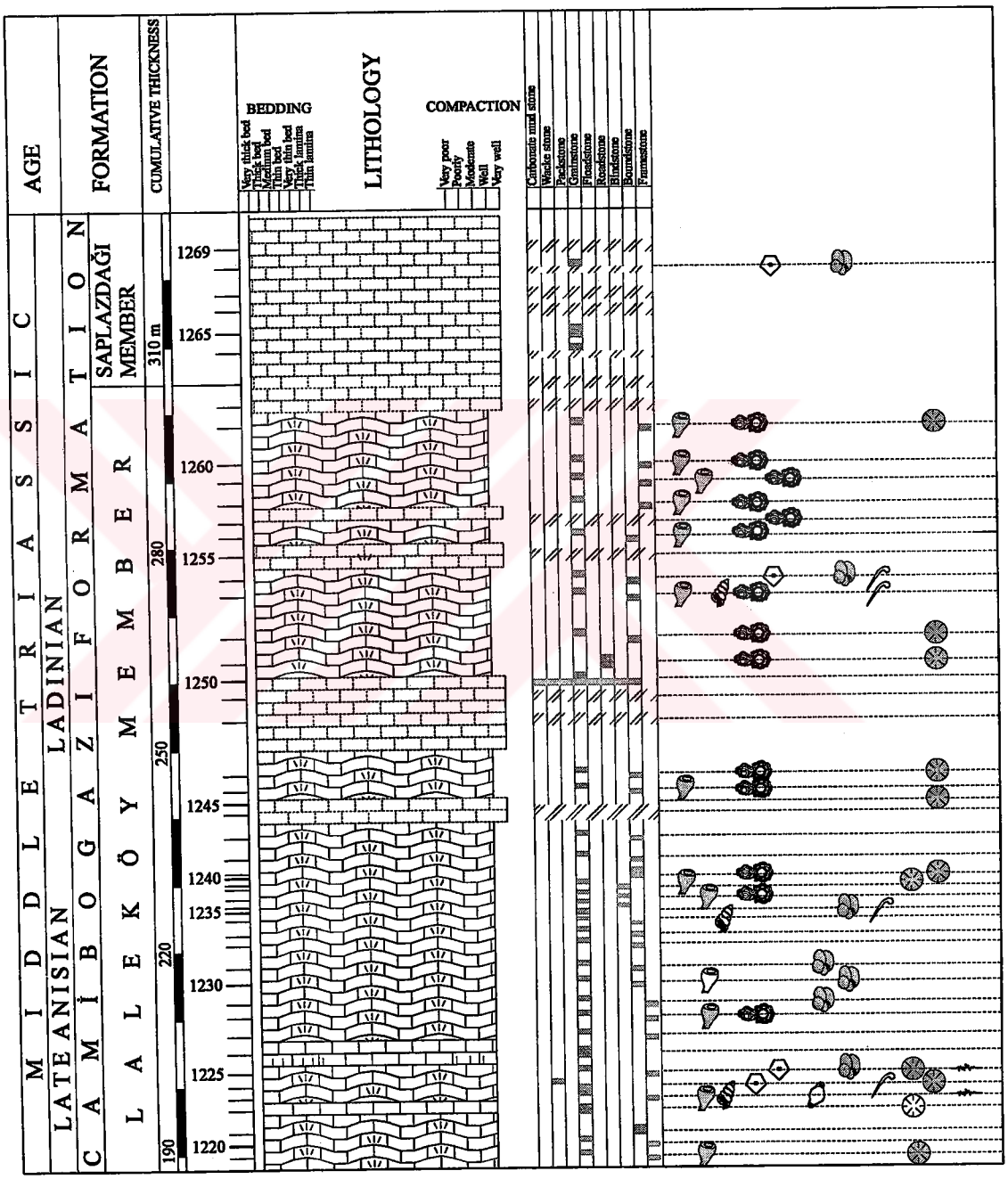


Figure 2. 12 Litostratigraphic Columnar Section of the Laleköy Member of the Camiboğazı Formation in the Narlıca Stratotype Section (Stratotype no. 1).


AGE
FORMATION
CUMULATIVE THICKNESS
MIDDLE TRIASSIC
LADINIAN
LATEANISIAN
CAMİBOĞAZİ FORMATION
LALEKÖY MEMBER
SAPLAZDAĞI MEMBER
310 m
190
220
250
280
1269
1265
1260
1255
1250
1245
1240
1235
1230
1225
1220
BEDDING
Very thick bed
Thick bed
Medium bed
Thin bed
Very thin bed
Thick lamina
Thin lamina
LITHOLOGY
COMPACTION
Very poor
Poorly
Moderate
Well
Very well
Carbonate mud stone
Wacke stone
Packstone
Grainstone
Floadstone
Rudstone
Bindstone
Boundstone
Framestone

Continued.

7. Horizon consists approximately of 15 meter thick, laminated to thick-bedded Radiolaria-rich limestone. It is made up of carbonate mudstone, fine-grained bioclastic wackestone intercalating with pelletal grainstone. Thin filaments and foraminifers are common components. Ammonites occur very sporadically.

8. Horizon consists of about 100 meter thick, light grey, very thick-bedded coral and sponge-rich biostromal limestone. It includes coral and sponge-bearing framestone and fine to coarse-grained grainstone. Allochems are derived from organic build-up formations.

9. Horizon consists of about 50 meter thick, light grey, very thick-bedded to massive, crustal algae-rich, coral and sponge-bearing algal biostromal limestone. It includes coral and sponge framestone, boundstone and coarse-grained grainstone with allochemes derived from organic build ups.

2. 3. 2. 3. Contact: The Laleköy member, rests conformably on the Gerence Formation, through an abrupt contact. At the Nohutalan Mahalle type section (Fig. 2. 12), the pinkish-white, about 5 meter thick limestone part of the Laleköy member rests gradually on the the green mudstone, mudshale and calcareous mudstone part of the Gerence Formation, through a red, clayey limestone. In the Çayaltı location, 1 kilometer north of the Ildır Village (Fig. 2. 6), the red and pinkish-red ammonite-rich limestone of the Laleköy member overlies abruptly the yellowish-green mudstone and sandy limestone alternations of the Gerence Formation.

Although the contact is stratigraphically conformable, it appears locally to be associated with a hiatus. In the Şemsibelli location, 2 km north of the Germeyan (İşintek et al., 2000), while the sandy limestone intercalating with mudstone of the Gerence Formation is conformably covered by dasyclad algae-rich brown limestone of the Laleköy member, in the Narlıca Type Section (Fig. 2. 12); the same dasyclad algae-rich brown limestone of the Laleköy member, rests on a conglomeratic layer of the Gerence Formation, through an erosional hiatus. In the same locality, in a 10 m distance, reddish grey ammonite-rich limestone of the Laleköy member occurs on the red chert and green mudstone of the Gerence Formation.

In some localities, as in the Alandere type section, where the Laleköy member directly rests on the mudstone of the Gerence Formation, the contact seems to be an angular unconformity, in relation to differential competence of the two formations. The competent limestone layers of the Laleköy member appear to have buried in less competent mudstone or calcareous mudstone layers of the Gerence Formation. This may be caused by slight folding of the mudstone layers of the Gerence Formation under the Laleköy member. The unit is conformably overlain by the Saplazdağı member of the Camiboğazı Formation.

2. 3. 2. 5. Age: The Laleköy member includes a foraminiferal fauna consisting of *Glomospira densa, Arenovidalina amilovoluta, A. chialingchiangensis, Triadodiscus eomesozoicus, Endotebanella* spp., *Glomospirella grandis, Ophthalmidium exiguum, Endoteba badoxi, E.* ex. gr. *obturata, Earlandia tintiniformis, Glomogallerium gazdzickii, Paulbrönnimella* cf. *whittakeri, Endotiadella wirzi, Turriglomina scandonei, Aulotortus sinuosus pragsoides, Lamelliconus multispirus, L. ventroplanus, L.* cf. *biconvexus, L. procerus?, Lamelliconus* sp., *Meandrospira deformata, Meandrospira* ? sp., *Turriglomina magna, T. mesotriasica, Earlandia amplimuralis, Paraophthalmidium* sp., *Palaeolituonella meridionalis, Endotebanella kocaeliensis, Paulbrönnimella* cf. *whittakeri, Endotiadella wirzi, Turriglomina scandonei , Endotebanella* sp. C, B, *Endotriada* spp., *Endotriadella* spp., *Turriglomina* sp., *Austrocolomia* sp., *Variostoma* sp., *Reophax* sp. A, B, C, D, E, *Reophax* sp., "*Textularia* n. sp., *Paleolituonella primativa* n. sp., *Ophthalmidium* spp., *Ammobaculites* sp., *Aulotortus* sp., *Galaenella* ? sp., Duostominid Foraminifera A, C, D, E, Doustominidae, Nodosariidae and unknown foraminifera C and D (Fig. 2.13).

At the Nohutalan Mahalle type section (Fig. 2. 2, 7, 10), the lowermost part of the Laleköy member contains a foraminiferal assemblage including *Arenovidalina chialingchiangensis, Arenovidalina* sp., Duostominidae, *Meandrospira pusilla, M. dinarica, Glomospira praedensa, Glomospira* sp., *Karaburunia triadica* (ex. Sigmoilina), Cornuspira ? sp., *Endoteba controversa, E. obturata, Trochammina* cf. *almtalensis, Paulbrönnimannia judicariensis, Turriglomina magna, Endotriada* sp.,

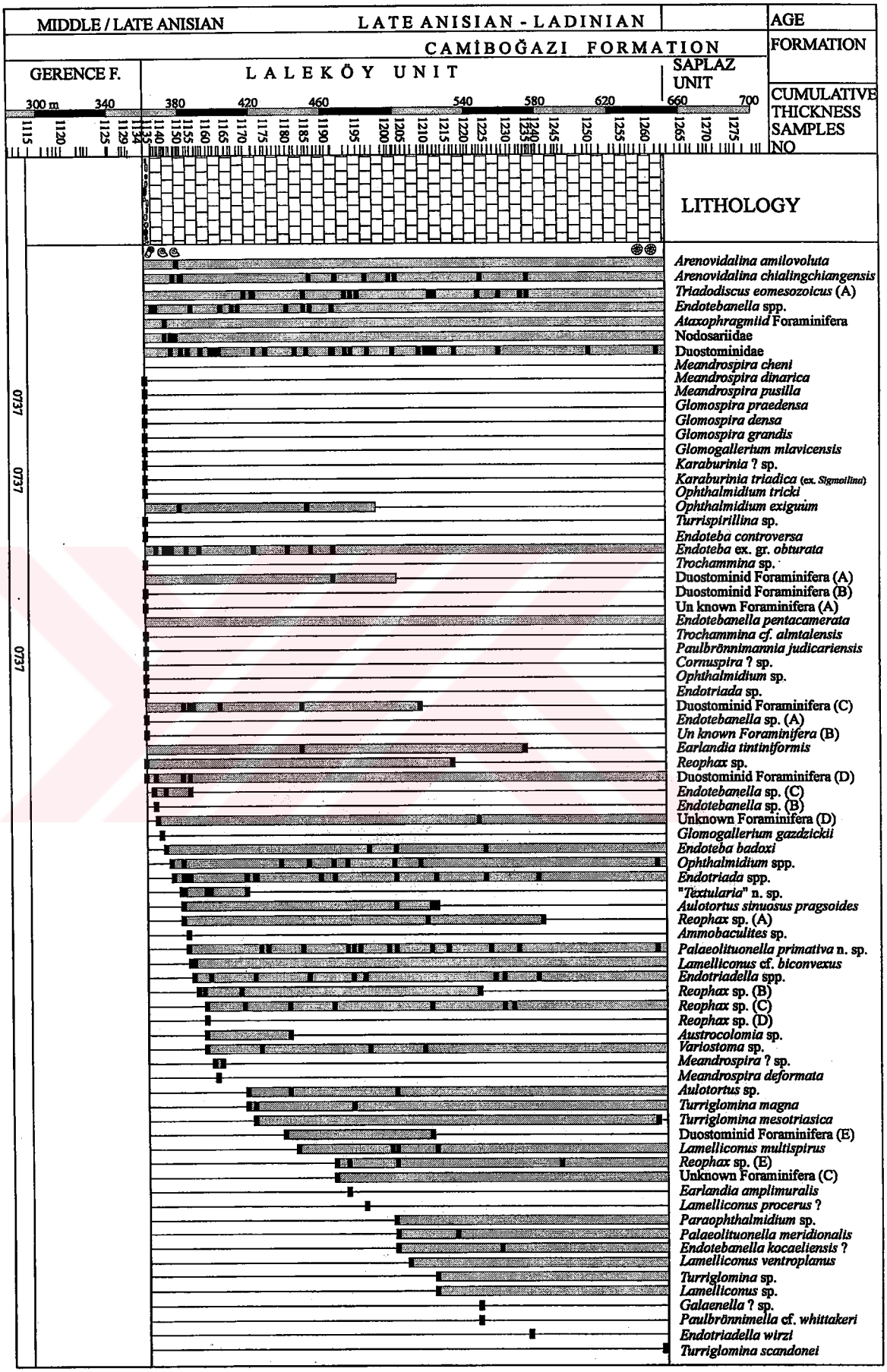


Figure 2.13 Stratigraphic Distribution of the Foraminifers in the Laleköy Member of the Camiboğazı Formation (Stratotype n. 1)

Ophthalmidium exiguum, *Opthalmidium* sp., *Palaeolituonella primativa* n. sp., *Endotebanella* sp. Higher in the section, the foraminiferal association is represented by *Endoteba controversa*, *Endotebanella* sp., *Turriglomina* sp., *Reophax* sp. *E*, *Glomospira densa*, *Endotriadella* sp., "*Textularia*" n. sp.

At the Şemsibelli type section of the Laleköy member (İşintek et al., 2000), the lowermost part is characterized by *Glomospira densa*, *Earlandia amplimuralis*, *Endotebanella pentacamerata*?, *E. kocaeliensis*, *Endotebanella*? sp., *Endotriada* cf. *kuepperi*, *Meandrospira dinarica*, *Meandrospira deformata*?, *Paulbrönnimannia*? sp., *Arenovidalina amylovoluta*, and some Duostominid and Nodosariid foraminifers. The rest of the Şemsibelli type section includes *Glomospirella* sp., *Endotebanella* sp., *Endotebanella* spp., *Earlandia amplimuralis*, *Endotriada* cf. *kuepperi*, *Meandrospira deformata*?, *Arenovidalina chialingchiangensis*, *Ophthalmidiun exiguum*, *Paraophthalmidium* sp., *Nubecularia* sp., *Triadodiscus eomesozoicus*, *Turriglomina mesotriasica*, *T. magna*, *Turriglomina* sp., *Palaeolituonella meridionalis*, and some duostominid and nodosariid foraminifers.

In the lowermost part of the Laleköy member, *Meandrospira pusilla* indicates a Middle Sycthian to Middle Anisian age (Rettori, 1995; Altıer & Kocyiğit, 1993). *Meandrospira dinarica* is characteristic for the Lower to Middle Anisian age (Rettori, 1995). *Glomospira densa* points out a Middle to a Late Anisian time interval (Rettori, 1995; Altıner & Koçyiğit, 1993). *Paulbrönnimannia judicariensis* reflects a Middle to Lower most Late Anisian age (Rettori, 1995). This foraminiferal content indicates a Middle to Late Anisian age for the lowermost part of the member.

In the middle part, existence of the Anisian (Rettori, 1995) *Meandrospita deformata,* Middle-Late Anisian (Rettori, 1995) *Paulbrönnimannella* cf. *whittakeri*, Middle Anisian, Late Anisian to late Triassic (Rettori, 1995) *Turriglomina magna,* Late Anisian to Late Triassic (Rettori, 1995) *Palaeolituonella meridionalis* and the absence of Middle Triassic foraminifers such as *Meandrospira dinarica* etc. indicates that the middle part of the member can be dated as Late Anisian.

The absence of any index Anisian foraminifer and the increasing abundance of Late Anisian ? to Carnian (Rettori, 1995) or Ladinian to Carnian (Altıner & Koçyiğit, 1993; Zaninetti, 1976) *Lamelliconus* species may indicate a Ladinian age for the upper part of the Laleköy member.

2. 3. 2. 4. Remarks: In this study, the "Laleköy Formation" of Brinkmann et al. 1972, is redefined as a subunit of the Camiboğazı Formation, and it exactly corresponds to the "Laleköy Formation" of Brinkman et al. (1972). Erdoğan et al., (1990) added the Formation to the "Gerence Formation" in their text, while they show in the "Camiboğazı Formation" on the map.

2. 3. 3. Saplazdağı member

2. 3. 3. 1. Description: The Saplazdağı member consists of light grey to light brown, whitish grey, thick-bedded to massive limestone succession. It is widely exposed in the surroundings of the Camiboğazı, Saplazdağı, Hanaylı Tepe and Nohutalan Mahalle localities (Fig. 2. 6).

2. 3. 3. 2. Lithology: In the Narlıcak stratotype (Fig. 2. 14), the member is represented by light grey, light brown to whitish grey, very thick-bedded to massive biostromal and allochemical limestones, It consists of irregulary alternating horizons. The representative horizons are the following.

1. Horizon consists of sponge and coral-rich, carbonate detritus-bearing algal biostromal limestone include calcified sponges and less commonly corals, which are bounded by algal crust, and variably sized detritus derived from algal biostroms. The algal crust comprises *Tubiphytes* and *Tubiphytes*-like algae and encrusting foraminifers. The pelloidal and intraclastic detritus are generally angular. The limestone is characterized by very large intra algal-framework spaces, which are filled by one or two fringes of radiaxiolitic spar with central blocky spar, and biostromal detritus. Rarely, foraminifers, pelecypods, gastropods and fragments of crinoids constitute the poor bioclastic content of the limestone.

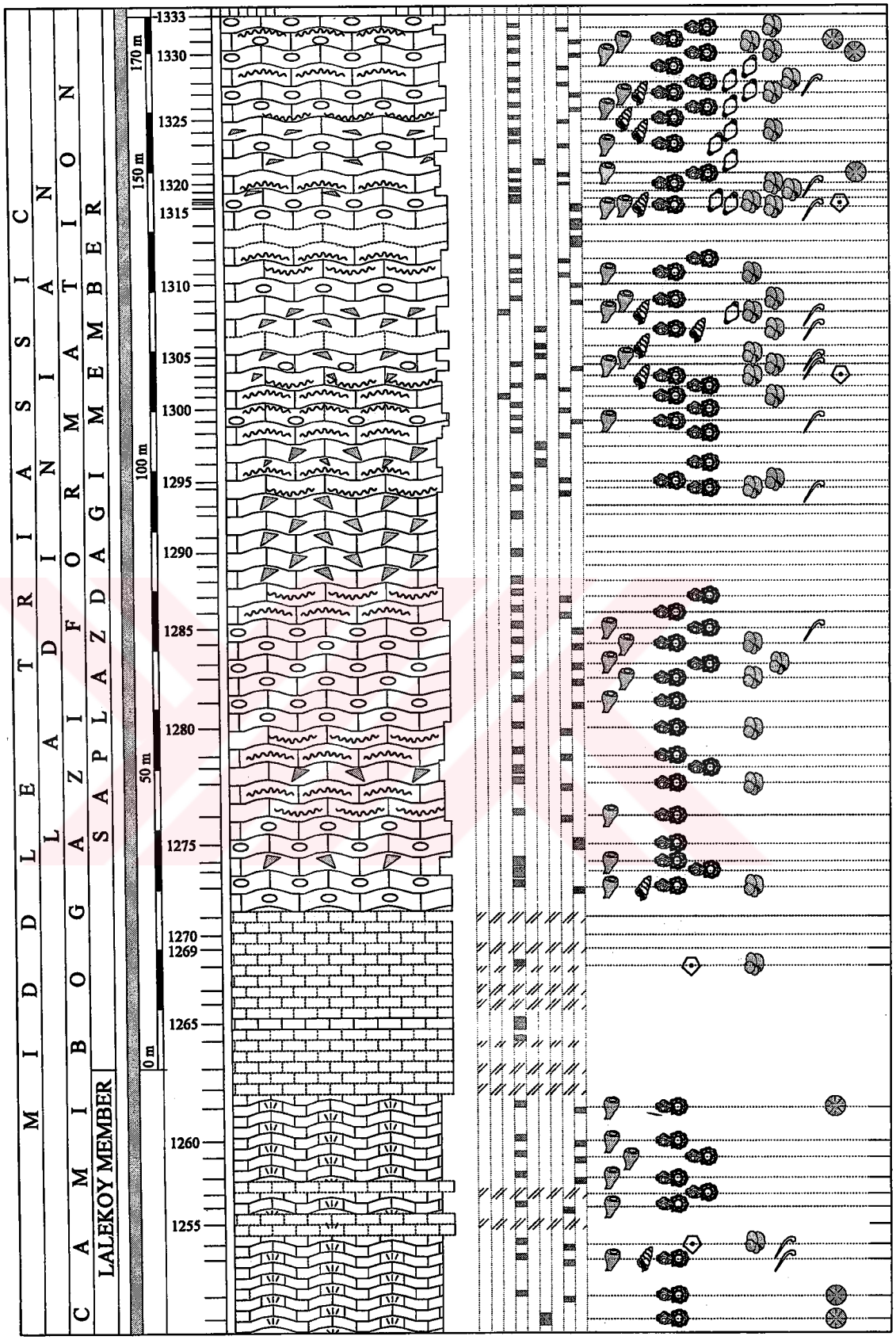
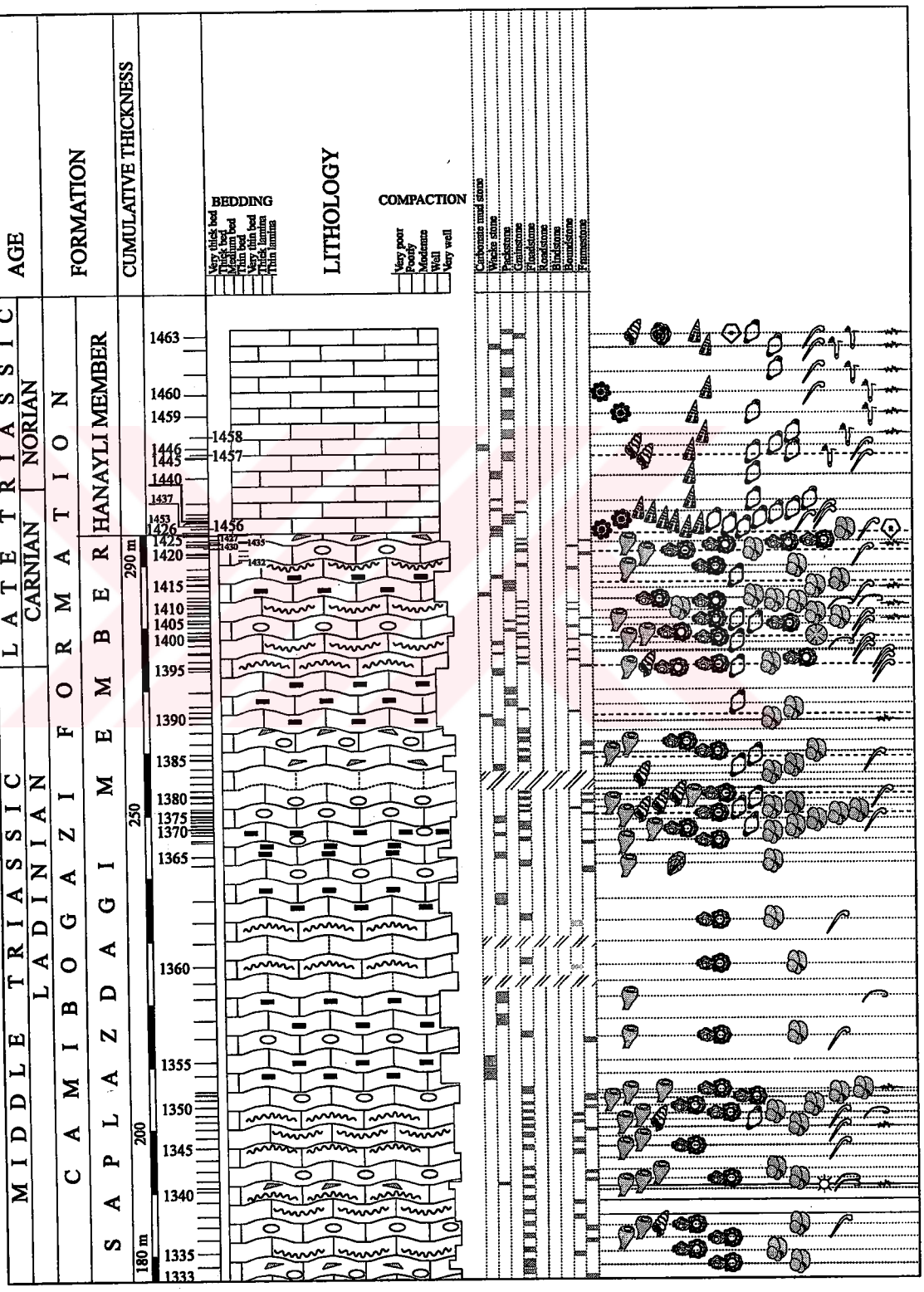


Figure 2. 14 Litostratigraphic Columnar Section of the Saplazdağı Member of the Camiboğazı Formation in the Narlıcak Stratotype (Stratotype no. 1).


AGE
FORMATION
CUMULATIVE THICKNESS
LITHOLOGY
BEDDING
COMPACTION
MIDDLE TRIASSIC
LATE TRIASSIC
LADINIAN
CARNIAN
NORIAN
CAMIBOGAZI FORMATION
SAPLAZDAGI MEMBER
HANAYLI MEMBER
290 m
250
200
180 m
1463
1460
1459
1458
1457
1456
1446
1445
1440
1437
1433
1426
1425
1420
1415
1410
1405
1400
1395
1390
1385
1380
1375
1370
1365
1360
1355
1350
1345
1340
1335
1333

Continued

2. Horizon consists of bioclast and detritus-bearing biostromal, algal biostromal limestone which contain abundant fine to coarse-grained carbonate detritus, reworked sponge fragments bounded by an algal crust, and locally an algal framework constructed by *Tubiphytes*, *Tubiphytes*-like algae and sporadic encrusting foraminifers. Detritus are commonly derived from algal crustal material. The same material might have been further fragmented and redeposited. Foraminifers and pelecypods occur rarely in the limestone. Large intra algal-framework pores which characterise the limestone, are filled by one or two radiaxiolitic fringes with central blocky spar.

3. Horizon consists of carbonate detritus-rich limestones made up of fine to coarse-grained carbonate detritus derived from both algal biostromes and intra algal-frameworks. The coarse carbonate detritus are very angular and form a grain-supported texture. Large intergranular pores are characteristic and are filled by one or two rows of radial spary calcite cement. The fine-grained carbonate detritus are commonly subangular, grain-supported and with blocky cement. The allochems contain rare sponge, *Tubiphytes* and other crustal algae, foraminifers, pelecypods, and crinoidal fragments.

4. Horizon consists of allochemical micritic and sparitic limestones including intraclastic bioclastic wackestone and packstone. Main bioclastic components are foraminifers, pelecypods and crustal algal fragments.

2. 3. 3. 3. Contacts: The contact between the Saplazdağı and Laleköy Members of the Camiboğazı Formation is conformable. The thick to massively and irregularly stratified biostromal limestone of the Saplazdağı member rests on the regularly stratified algal biostromatolitic layers of the Laleköy member. The Saplazdağı member is conformably overlain by the Hanaylı member of the Camiboğazı Formation.

2. 3. 3. 5. Age: The Saplazdağı member seems to have contained an Anisian to Norian foraminiferal fauna and some Anisian-Ladinian dasyclad algae. The

foraminifers are *Arenovidalina amilovoluta, A. chialingchiangensis, Triadodiscus eomesozoicus, Endotebanella pentacamerata, E. kocaeliensis, Endotebanella* or *Ammobaculites* sp., *Endoteba badouxi, E.* ex. gr. *obturata, Endotebanella* sp., *Lamelliconus* cf. *biconvexus, Lamelliconus* sp., *Turriglomina magna, Turriglomina* sp., *Palaeolituonella meridionalis, Palaeolituonella primativa* n. sp., *Gandinella* sp. aff. *G. falsofriedli, Aulotortus praegaschei, A. friedli, Aulotortus* sp., *Agathammina ?iranica, Ophthalmidium* spp., *Endotriada* spp., *Endotriadella* spp., *Reophax* sp. (C), *Variostoma* sp., *Reophax* sp. (E), *Paraophthalmidium* sp., Nodosariidae, Duostominidae, Duostominid Foraminifera (C), and (D), Unknown Foraminifera (C) and (D), Ataxophragmiid foraminifers (fig. 15), and the dasyclad algae are *Diplopora anulata* (pl. 78, figs. 1-5), *Diplopora nodosa* (Pl. 79. Figs. 2-5), *Teutloporella ?* sp. (Pl.76, Figs. 6-7) (Fig. 2. 15).

In the upper part of the Laleköy member, a possible biotopic disappearance of Anisian index foraminifers is recognized. In the same unit, the onset of the occurrence of *Lamelliconus biconvexus, L. ventroplanus* as index for the Ladinian-Carnian time interval (Altıner & Koçyiğit, 1993, in Turkey; Zaninetti, 1976; Zaninetti et al., 1982 in the Taurus; Rettori, 1995), suggests a Ladinian age for the comformably overlying lower part of the Saplazdağı member.

In the Camiboğazı stratotype locality, in the uppermost 50 m thick part of the member, the presence of the Anisian-Ladinian aged (Granier & Deloffre, 1994) *Diplopora nodosa* (pl. 79. figs. 2-5), and *Diplopora anulata* (pl. 78, figs. 1-5) indicate that the member is still Ladinian in age. In this interval, the Anisian-Ladinian dasyclad algae gradually disappear, and replaced by the Ladinian-Carnian (Ciarapica et al. 1984) *Agathammina? iranica*, Middle Ladinian-Norian (Altıner & Koçyiğit, 1993) *Aulotortus praegashei* and the Carnian to Rhaetian (Peybernes et al. 1991; Ciarapica & Zaninetti, 1985) *Gandinella* sp. aff *G. falsofriedli*. Thus, a Carnian age for the top of the Saplazdağı member can be suggested.

2. 3. 3. 4. Remarks: The Şaplazdağı member corresponds to the Camiboğazı Formation of Brinkman et al. (1972), and Erdoğan et al (1990).

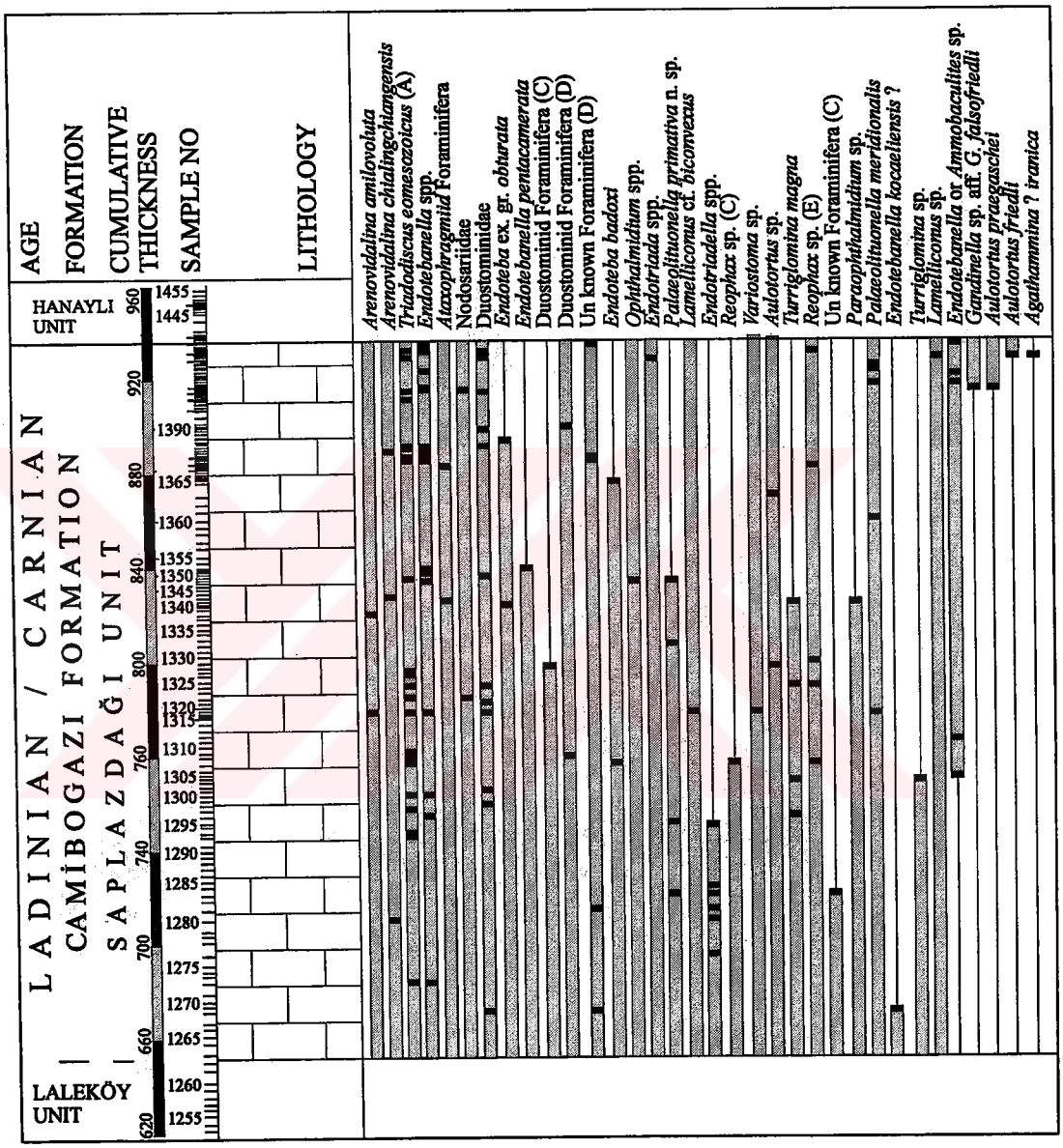


Figure 2.15 Stratigraphic Distribution of the Foraminifers in the Saplazdağı Member of the Camiboğazı Formation Stratotype n. 1)

2. 3. 4. Hanaylı member

2. 3. 4. 1. Description: The Hanaylı member is characterized by medium to thick-bedded (15 to 100 cm), light brown, reddish brown to brown, pelecypod-rich limestone succession intercalated with clayey pelecypod-bearing limestones, dolomitic limestones and dolomite layers. The unit is widely exposed in the surroundings of the Hanaylı Tepe, the Saplazdağı, Söğütçük location, Sarıalan Tepe, Çukuralanıüstü Tepe and Nohutalan village (Fig. 2. 6).

2. 3. 4. 2. Lithology: The lamellibrach-rich limestone is represented by involutinid foraminifer-rich, pelletal, intraclastic, bioclastic packstone and grainstone microfacies and rare alternations of carbonate mudstone microfacies. The allochems include gastropod, dasyclad algae, glomospiroid foraminifers and rare crinoidal fragments. Occurrence of fecal pellets and stylolites indicate widespread bioturbation (Fig. 2. 16 and 17).

The pelecypod-bearing clayey limestone is made up of reddish brown clayey, in parts dolomitized carbonate mudstone. Allochems include sporadic gastropods and involutinid foraminifers.

2. 3. 4. 3. Contacts: The member rests conformably on the Saplazdağı member. The boundary relations are exposed in the Camiboğazı location and 200 m south of Söğütçük location. To the NNE of the Hanaylı Tepe, the contact may also be followed. In the Söğütçük location, very thick-bedded to massive, whitish grey algal biostromal limestone of the Saplazdağı member is abruptly overlain by light brown to brown, regularly stratified, medium to thick-bedded pelecypod-rich limestones of the Hanaylı member, along a more or less smooth surface.

To the east of the Saplazdağı, in the Çukuralanıüstü location and Kırkpınar tepe some structural slices of the Hanaylı member rest on the different parts of the Güvercinlik Formation (See fig. 2. 2a, b, 2. 6).

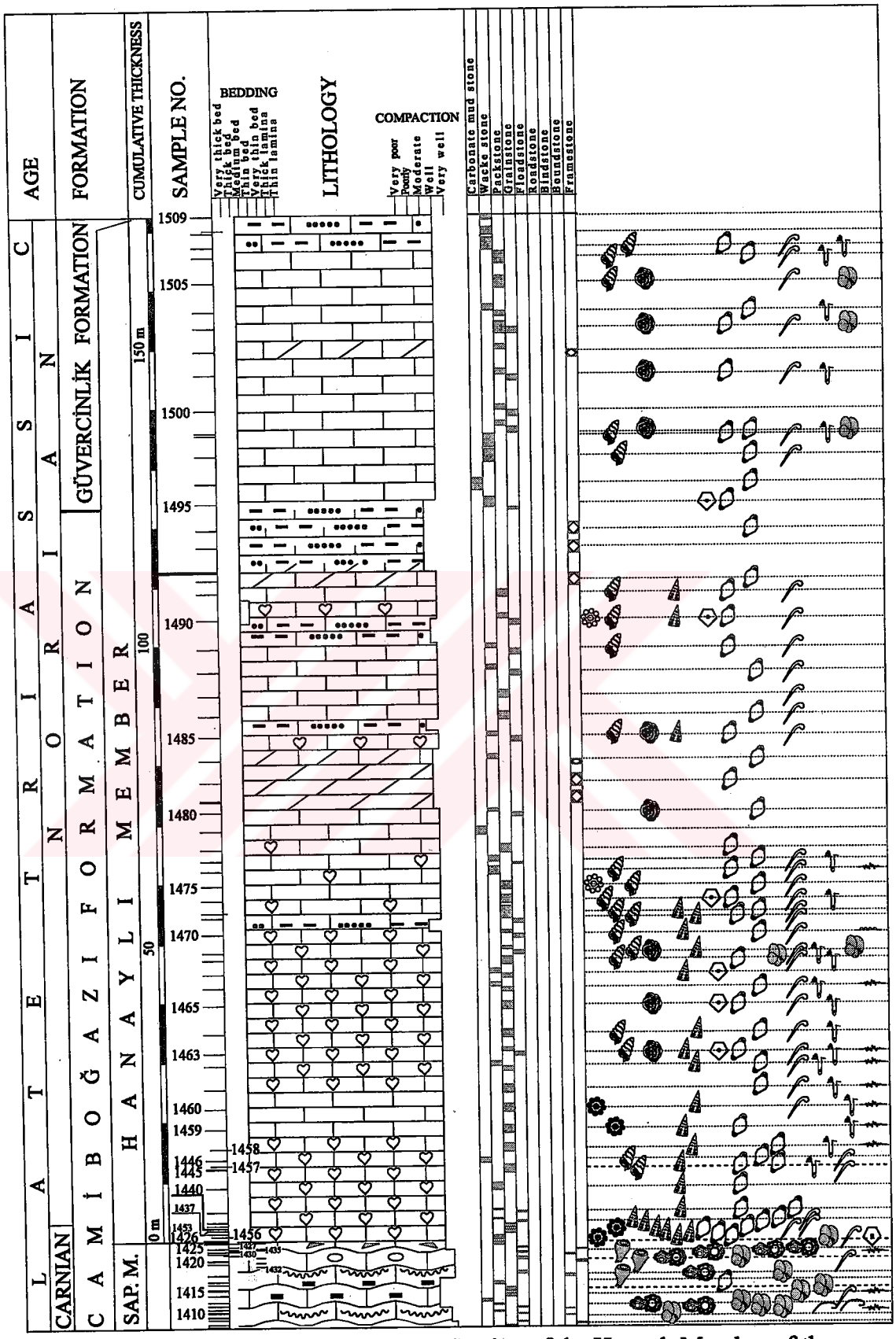


Figure 2. 16 Litostratigraphic Colomnar Section of the Hanaylı Member of the Camiboğazı Formation in the Narlıcak Stratotype (Stratotype no. 1).

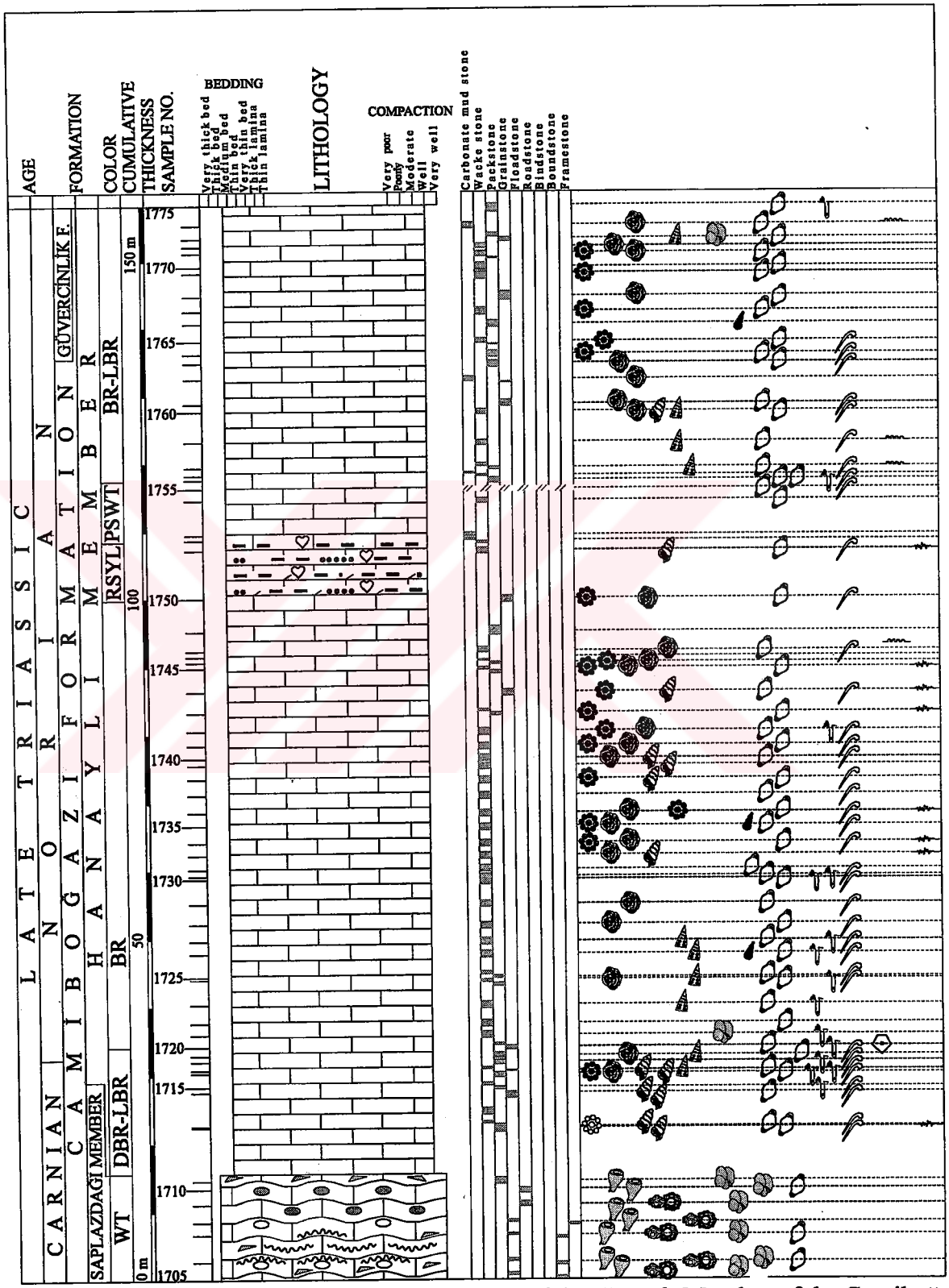


Figure 2. 17 Litostratigraphic Columnar Section of the Hanaylı Member of the Camiboğazı Formation in the Camiboğazı Stratotype (Stratotype no 5).

2. 3. 4. 5. Age: The member contains a microfossil assemblage including *Arenovidalina amilovoluta, Triadodiscus eomesozoicus, Lamelliconus multispirus, L.* cf. *biconvexus, L. ventroplanus, L. procerus, Lamelliconus* sp., *Palaeolituonella meridionalis, Gandinella* sp.aff. *falsofriedli, Aulotortus friedli, A. praegaschei, A. communis, A.* gr. *sinuosus, A. tenuis, A. impressus, A. tumidus, Aulotortus* sp., *Glomospira* sp. aff. *rosetta, Gandinella falsofriedli, Glomospirella* gr. *expansa, Glomospirella* n. sp., *Agathammina austroalpina, Triasina oberhauseri, Auloconus* sp.?, *Variostoma* sp., *Endotebanella* or *Ammobaculites* sp., *Ophthalmidium* sp., (A) and (B), *Reophax* sp. (E), *Ophthalmidium* spp., Ataxofragmiid foraminifer Nodosariidae, Duostominidae, Duostominid Foraminifera (D) and (F), Unknown Foraminifera (D), and *Teutloporella herculae* (Pl. 76, Figs. 5-8), *Clypeina* sp. cf. C. *besici* (Pl. 84, Figs 1-4), *Physoporella pouciforata* var. *undulata* (Pl. 82, Figs. 3-5), *P. pouciforata* var. *sulcata* ? (Pl. 83. Fig. 1), cf. *Poikiloporella dublicata* (Pl. 83. Fig. 4), *Teutloporella* ? sp (Pl. 76, Fig. 6).

The above foraminifers indicate a general Late Triassic age. However, the lowermost 5-6 m thick part of the member, overlying the Carnian layers of the Saplazdağı member includes *Lamelliconus* cf. *biconvexus, L. procerus, L. multispirus* and *Gandinella falsofriedli* reflecting that the Carnian prevails. The apperance of *Aulotortus communis* in the overlying layers, which indicates a Norian/Rhaetian (Zaninetti, 1976; Altıner & Koçyiğit, 1993) age, implies that the rest of the member is Norian in age . In the uppermost part of the member, the presence of *Triasina oberhauseri* supports a Norian age (Zaninetti, 1976; Gazdzicki, 1983; Altıner & Koçyiğit, 1993; the Alaunian, Salaj et al. 1988), (Fig. 2. 18).

2. 3. 4. 4. Remaks: The member corresponds to the "Hanaylı Formation" of Brinkmann et al. (1972) and to the Lower part of the "Güvercinlik Formation" of Erdoğan et al. (1990).

In this study the Hanaylı member is considered to be a part of the Camiboğazı Formation. The member is free of epiclastic strata The gradational contact zone with the Güvercinlik Formation is defined by the pelecypod-bearing clayey

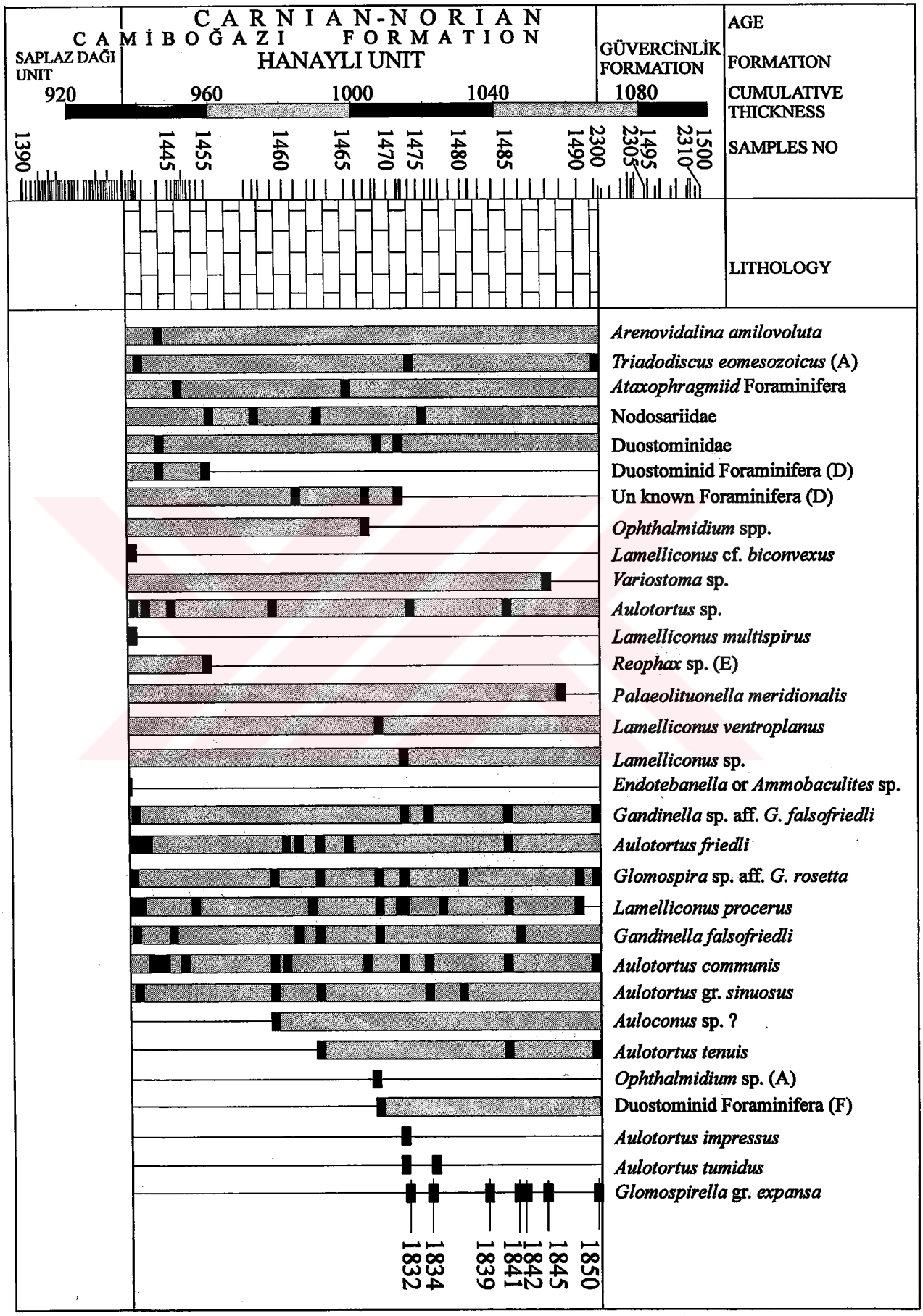


Figure 2. 18 Stratigraphic Distribution of the Foraminifers in the Hanaylı Member of the Camiboğazı Formation (Stratotype n. 1)

limestone layers. Thus, it is possible to consider that the Hanaylı member is a part of Camiboğazı Formation representing a uniformly carbonate succession, rather than the Güvercinlik Formation which is characterized by conglomerate, sandstone, claystone, dolomite and dolomitic limestone.

2. 4. GÜVERCİNLİK FORMATION

2. 4. 1. Description: The Güvercinlik Formation is characterized by laterally discontinuous, yellowish red, fine-grained conglomerate, sand and siltstone, reddish to yellowish white claystone, clayey limestone and dolomite, dolomitic limestone and dolomite. It is widely exposed in the Bahçeli location and Çukuralan Tepe, in the surroundings of the Salıyeridağı and in the Güvercinlik location; to the north, centre and south of the study area, respectively (Fig. 2. 6).

2. 4. 2. Lithology: The Güvercinlik Formation is composed of laterally interfingering, and/or alternating representative horizons (Fig. 2. 19).

1. Horizon consists of reddish, fine-grained conglomerate made up of fine-grained white quartz sand, minor red and black quartz pebbles. It grades laterally into red sandstone. Maximum grain size is 2 to 3 cm. The texture of conglomerate is grain and/or matrix supported. The grains are in average 0,3 to 1.5 cm in size. The matrix is characterized by sparry calcite cement or reddish-coloured clay to fine sand-sized detritus. The quartz pebbles are subrounded to rounded and have high sphericity. In the Bahçeli location, to the north of Hanaylı Tepe and in the Güvercinlik location, the reddish fine-grained conglomerate commonly occurs in the lovermost part of the Güvercinlik formation. It is also exposed in the vicinity of the Salıyeridağı, Kırkpınar Tepe and to the east of the Saplazdağı where the structural slices of the Hanaylı and Saplazdağı Members of the Camiboğazı Formation are on the Güvercinlik Formation.

2. Horizon consists of yellowish red sandstone. It is laterally discontinuous, thin to medium-bedded, locally cross-bedded and quartz-rich; rarely rock fragment-

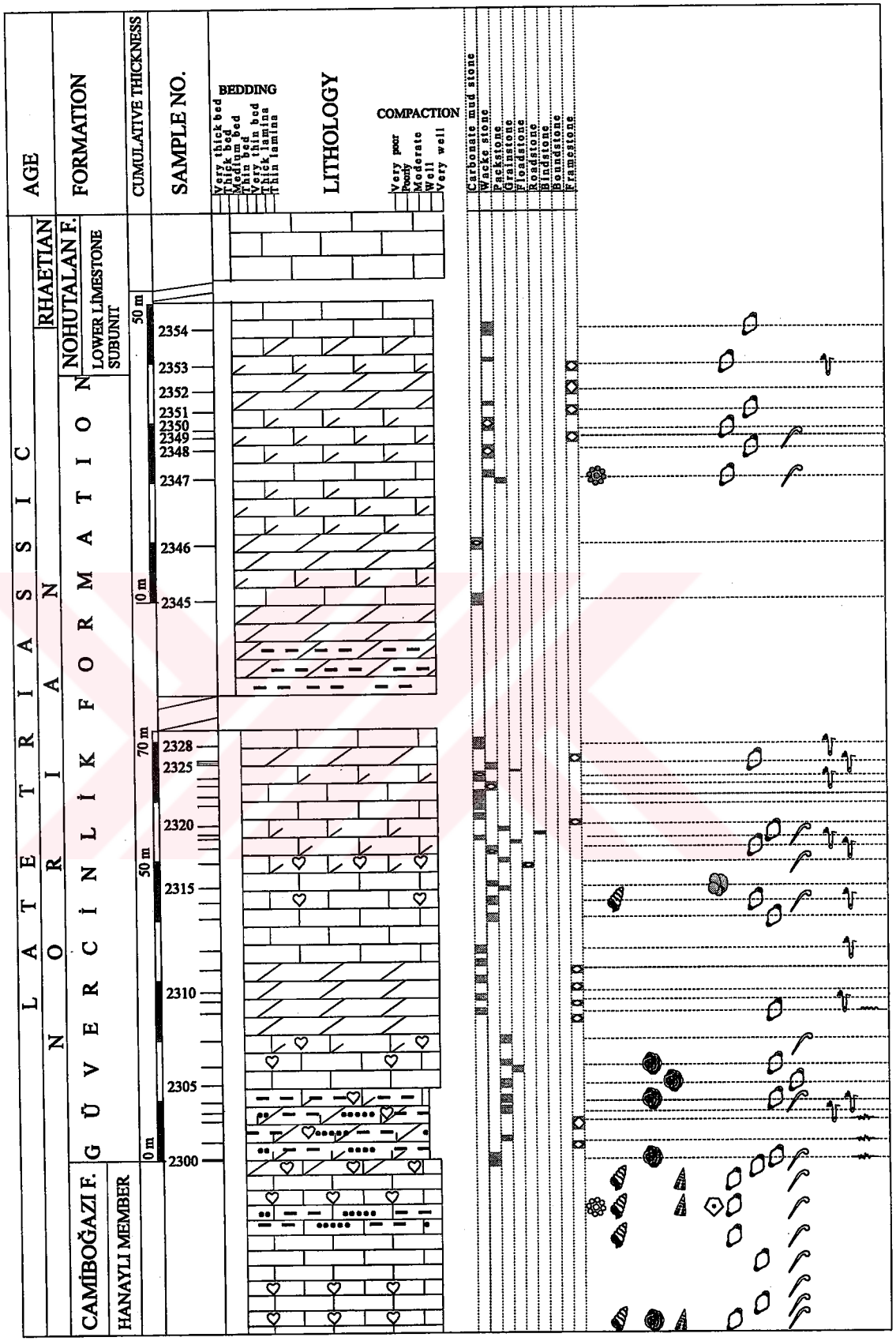


Figure 2. 19 Lithostratigraphic Columnar Section the Güvercinlik Formation in The Salıyeri Dağı and Uzunkuyu (Stratotype no. 4 and 13).

bearing, medium to coarse-grained sandstone and siltstone. The sandstone is well sorted, and contains subrounded to rounded grains, cemented by spar calcite. Fine-grained sandstone and siltstone are reddish and with clay matrix. The sandstone layers laterally grade into conglomerate and clayey limestone layers. They are commonly found in the lowermost part of the formation and also in the surroundings of structural slices of the Hanaylı and Saplazdağı Members.

3. Horizon consists of clayey limestone occurring in different levels of the Formation. It is composed of reddish-yellow, locally lamellibranch-bearing clayey limestone with rare gastropod and involutinid foraminifers. The clayey limestone is characterized by carbonate mud with local imprints of dolomitization. In the lowermost part of the formation, the clayey limestone layers may include "Carniol" structures in probable relation with evaporitic facies.

4. Horizon consists of reddish to yellowish white claystone. It is thin to medium-bedded, poorly to moderately consolidated. The claystone is intercalated with dolomitic limestone or dolomite horizons. Thickness of claystone beds are commonly reduced in relation to late compressive deformation and poor indurations of clay beds. Where the folding is very tight, the claystone layers occur to be stretched and broken.

5. Horizon consists of dolomitic, stromatolitic limestone including yellowish white and light brownish to brown, medium to thick-bedded, locally laminated dolomitic limestone and sparsely stromatolitic limestone (Fig. 2. 19). It is represented by bioclastic carbonate mudstone and bioclastic wackestone, which locally include involutinid foraminifers, dasyclad algae, gastropods and lamellibranchs. The bioclastic carbonate mudstone and stromatolitic limestone, in parts, are filled by fenestral calcite.

6. Horizon consists of dolomite. It is composed of yellowish white, pinkish red, light brown to white thick to very thick-beds and is made up of fine to coarse crystal mosaic. The dolomite layers are intercalated with dolomitic and stramatolitic

limestone. They can be related to pervasively dolomitized sediments deposited on a great tidal flat comprising the western end of the Pangean Gulf extending from Spain to Hungary and Greece (Frisia,1994).

2. 4. 3. Contacts: The Güvercinlik Formation rests conformably on the Hanaylı member of the Camiboğazı Formation (Fig. 2. 20). At the uppermost part, shallow water limestones of the Hanaylı member are interbedded with the lammellibranch-bearing clayey limestones. The basal part of Güvercinlik Formation is defined by terrigenous quartz-rich conglomerate, sandstone and claystone or clayey limestone. The contact is exposed in the Bahçeli locality, in the Kadıovacık stratotype locality (Fig.2. 21) and in the Salıyeridağı stratotype locality (Fig. 2. 19). The contact is defined by terrigenous clastics representing the beach conditions with more or less oxidizing conditions.

The Formation conformably grades into the overlying Lower limestone subunit of the Nohutalan Formation.

2. 4. 4. Age: The Formation contains a foraminiferal fauna including *Aulotortus communis, A. tenuis, A. gaschei, Triadodiscus eomesozoicus* and *Triasina oberhauseri* which indicate a Norian- Rhaetian age (Zaninetti, 1976, Gazdzicki, 1983, Salaj et al. 1983 and 1988, Altıner & Koçyiğit, 1993). However, in the absence of data on Rhaetian, the Formation is suggested to be the Norian in age (Fig. 2. 20).

2. 4. 5. Remarks: The Güvercinlik Formation was first described by Brinkmann et al. (1972) as consisting of reddish brown, fine-grained conglomerate, sandstone, siltstone and whitish dolomite and dolomitic limestone. In the study, the Güvercinlik Formation corresponds to both the "Güvercinlik Formation" and the "dolomite unit" of the "Nohutalan Formation" of Brinkmann et al.(1972) and the Middle part of the "Güvercinlik Formation" of Erdoğan et al. (1990). Erdoğan et al. (1990) described the underlying "Hanaylı Formation", the overlying "dolomite" and "Rhaetian limestone unit of the Nohutalan Formation" of Brinkmann et al. (1972), in the Güvercinlik Formation.

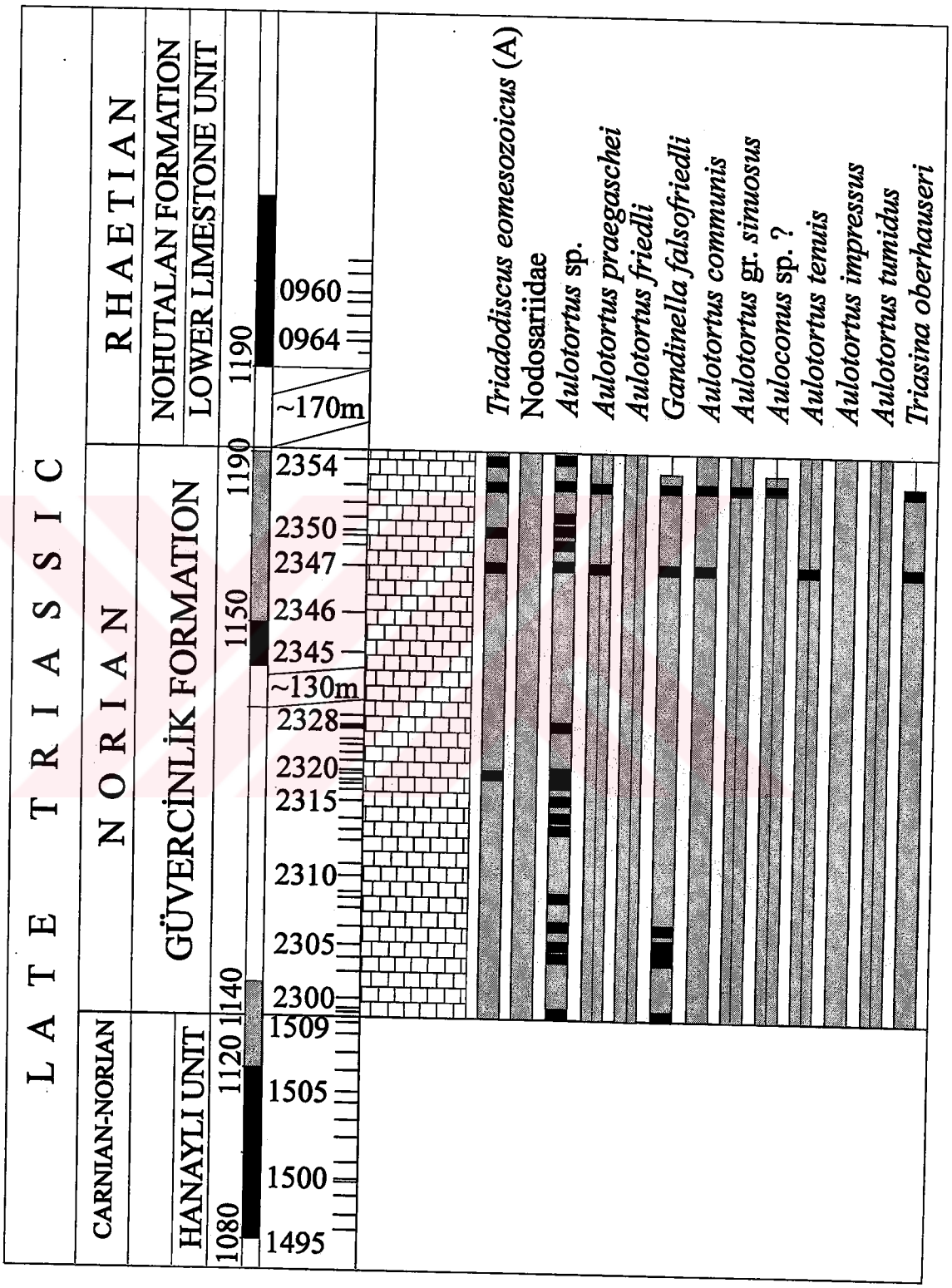


Figure 2. 20 Stratigraphic Distribution of the Foraminifers in the Güvercinlik Formatin (Stratotype n. 1 and 4)

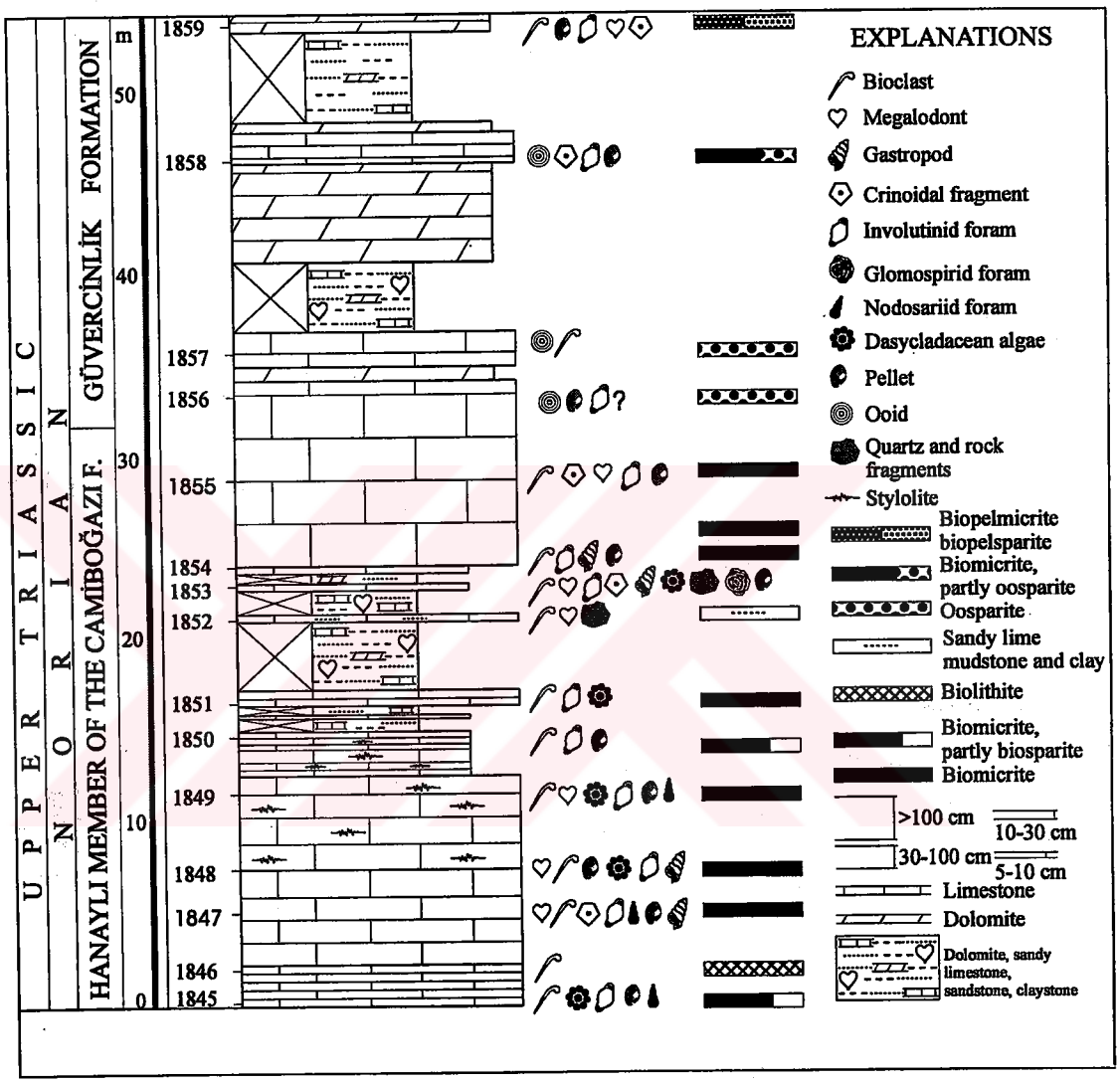


Figure 2. 21 Litostratigraphic Columnar Section of the Contact Interval Between the Hanaylı Member of the Camiboğazı Formation and the Güvercinlik Formation (Stratotype no. 8)

The dolomite of the Güvercinlik Formation and the "dolomite" unit of the Nohutalan Formation can not be easily distinguished from each other in the field. Therefore, in this study the "dolomite" unit of the Nohutalan Formation of Brinkmann el al. (1972) is inserted into the Güvercinlik Formation.

2. 5. NOHUTALAN FORMATION

The formation is characterized by thick-bedded stromatolitic and bioclastic limestone and very regularly stratified medium to thick-bedded allochemical limestone. It is widely exposed in the surroundings of the Kocadağ, to the south of Nohutalan village; Çengen dağı and Yumru Tepe, to the west of the Birgi village, Örendağı and Ortadağ to the southeast of the Kadıovacık village. The formation is divided into two informal subunits i) a Lower limestone subunit and ii) an Upper limestone subunit (Figs. 2. 22 and 23).

2. 5. 1. Remarks: The "Nohutalan Formation" consists of Norian to Liassic limestone succession (Brinkmann et al., 1972). The authors divided the Formation from base to top, into the informal "dolomite", "Rhaetian limestone" and "Liassic limestone" units consisting, respectively, dolomite, micritic limestone and micritic-sparitic limestone. In this study, the "Nohutalan formation" corresponds to the "Rhaetian limestone" and "Liassic limestone" units of the "Nohutalan Formation" of Brinkmann et al., (1972).

In this study, the Lower limestone subunit of the Nohutalan Formation corresponds to the upper part of the Güvercinlik Formation of Erdoğan et al. (1990). The Upper Limestone subunit of the Nohutalan Formation forms the lower part of the "Nohutalan Formation" of Erdoğan et al. (1990).

2. 5. 2. Lower limestone subunit

2. 5. 2. 1. Description: The Lower limestone subunit consists of whitish, light brown, thick-bedded, laminated, stromatolitic and bioclastic limestone which is

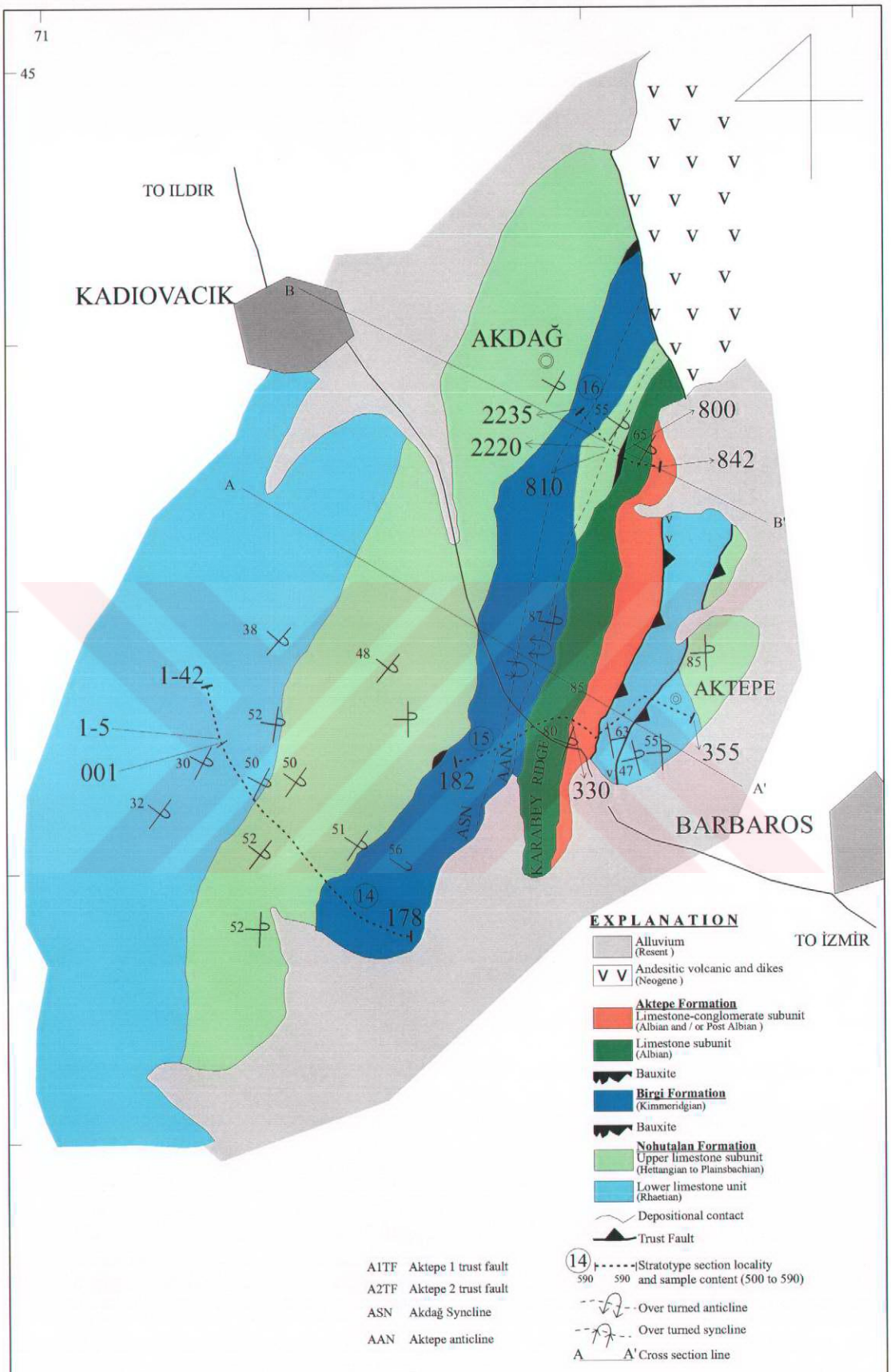


Figure 2. 22 Revised Distribution of the Rock Units in the Barboros Mab Area and Locations of Stratotype Sections.

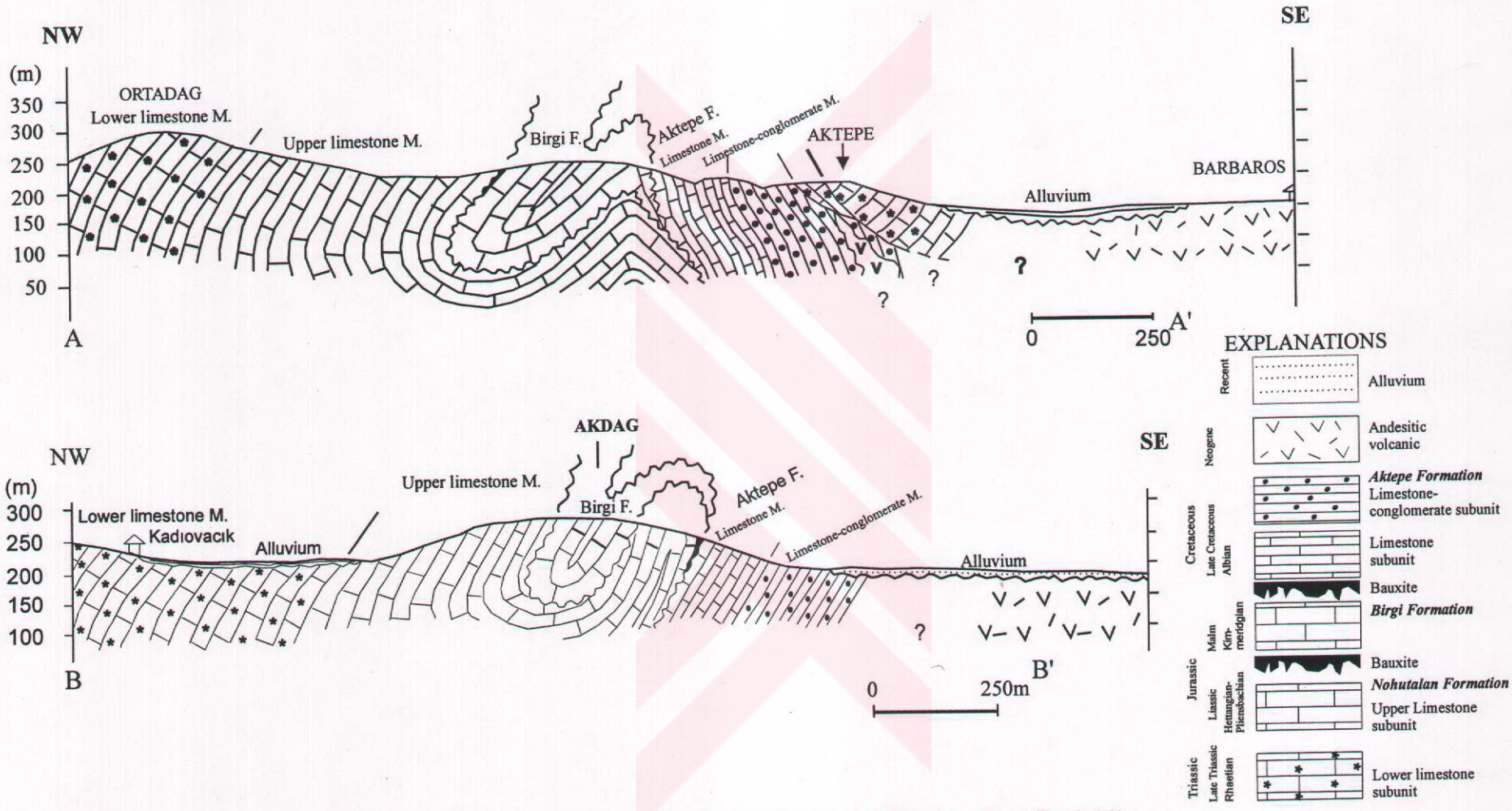


Figure 2. 23 Cross Sections showing Relations of Rock Units In the Barbaros Map Area(See fig. 2 22)

widely exposed in the Kocadağ, to the southeast of Nohutalan village, in the Çengendağı and Yumru Tepe, to the east of the Birgi village. The type section is located about one kilometer south-east of the Nohutalan village along the İzmir-Çeşme highway (Fig. 2. 7).

2. 5. 2. 2. Lithology: The subunit consists of stromatolitic limestone and bioclastic limestone. Stromatolitic limestone is dominant in the lower and middle parts of the subunit. It is represented by brown to light brown, thick-bedded, wavy-laminated algal stromatolitic limestone, commonly, having fenestral calcite fillings. Intercalation with bioclastic limestone is common. The bioclastic limestone is characterized by bioturbated, bioclastic carbonate mudstone and pelletal, bioclastic wackestone.

In the Çeşme road type section (Figs. 2. 24), the upper part of the subunit is made up dominantly of light brown to light brownish white, thick-bedded, locally laminated bioclastic limestone characterized by bioclastic carbonate mudstone, pelletal intraclastic and bioclastic wackestone, and packstone. Sporadic lamellibranch, gastropod, dasyclad algae and *Thaumatoporella* fragments, abundant involutinid and glomospiroid foraminifer are the bioclastic components of the limestones. Bioturbation and fecal pellets are also common. At the uppermost 50 m, the unit is represented by *Thaumatoporella*-rich algal carbonate mudstone including very rare ataxofragmiid foraminifers.

In the Örendağı stratotype (Fig. 2. 22), to the northwest of Birgi village, in the uppermost part, the subunit is represented by brown, light brown to white, thick bedded, *Thaumatoporela parvovesiculifera*-rich, algal carbonate mudstone, bioclastic wackestone, and *Thaumatoporella parvovesiculfera* bindstone, which is intercalated with intraclastic and oolitic grainstone, and bioclastic pelletal packstone.

2. 5. 2. 3. Contacts: The Lower limestone subunit overlies conformably the Güvercinlik Formation. The lowermost stromatolitic limestone of the Lower limestone subunit rests on the dolomite and slightly dolomitized top layers of the

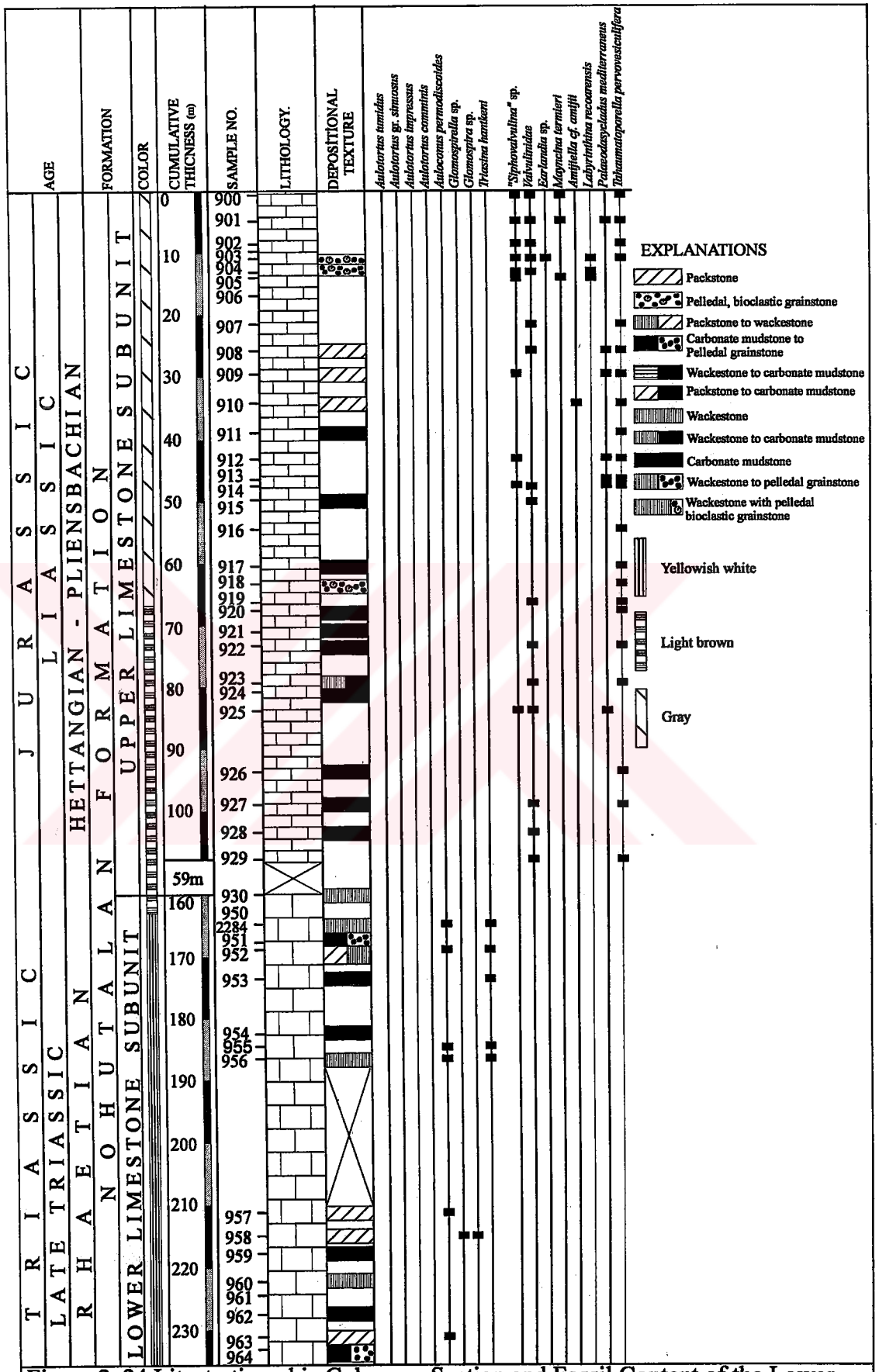


Figure 2. 24.Litostratigraphic Columnar Section and Fossil Content of the Lower and Upper Limestone subunits of the Nohutalan Formation.

Güvercinlik Formation. Remarkably, the dolomite layers of the Güvercinlik Formation contain stromatolitic, laminated limestone interbeds. The contact can be laterally followed and mapped to the east and south-east of Nohutalan village. The subunit is conformably overlain by the upper limestone subunit of the Nohutalan Formation.

2. 5. 2. 4. Age: The lower and middle parts of the Lower limestone subunit contain a Norian-Rhaetian foraminiferal fauna including *Aulotortus communis*, *A. tenuis*, *A. praegaschei*, *A. friedli*, *A. siniosus sinuosus*, *A. ? impressus*, *Auloconus permodiscoides*, *Glomospirella* sp.? and *Glomospira* sp. (Zaninetti, 1976; Altıner & Koçyiğit, 1993) and *Triasina hantkeni* indicating a Rhaethian age (Ciarapica & Zaninetti, 1984; Salaj et al. 1988, Altıner & Koçyiğit, 1993). The uppermost, 40 m thick part of the subunit contains *Palaeodasycladus mediterraneus* which indicates a Early, Middle Liassic age (Bassoullet et al. 1978), (Figs. 2. 25 and 26).

2. 5. 2. 5. Remarks: The subunit corresponds to the "Rhaetian limestone unit" of the "Nohutalan Formation" of Brinkmann et al. (1972), and the upper part of the "Güvercinlik Formation" of Erdoğan et al. (1990).

2. 5. 3. Upper limestone subunit

2. 5. 3. 1. Description: The upper limestone subunit consists of light brown to brown and grey, medium to thick-bedded, very regularly stratified, locally laminated limestones. The subunit is exposed in the surroundings of Kocadağ and Akdağ, and to the eastern side of Örendağ and Çengendağ. The representative stratotype of the subunit is situated in the Örendağı, to the north-east of the Birgi village. The partial stratotype is exposed along the İzmir-Çeşme highway, to the south of Birgi village (Fig. 2. 24).

5. 3. 2. Lithology: In the Örendağı stratotype section (Fig. 2. 26), the limestone consists of alternating (i) intraclastic and foraminifer-bearing bioclastic grainstone;

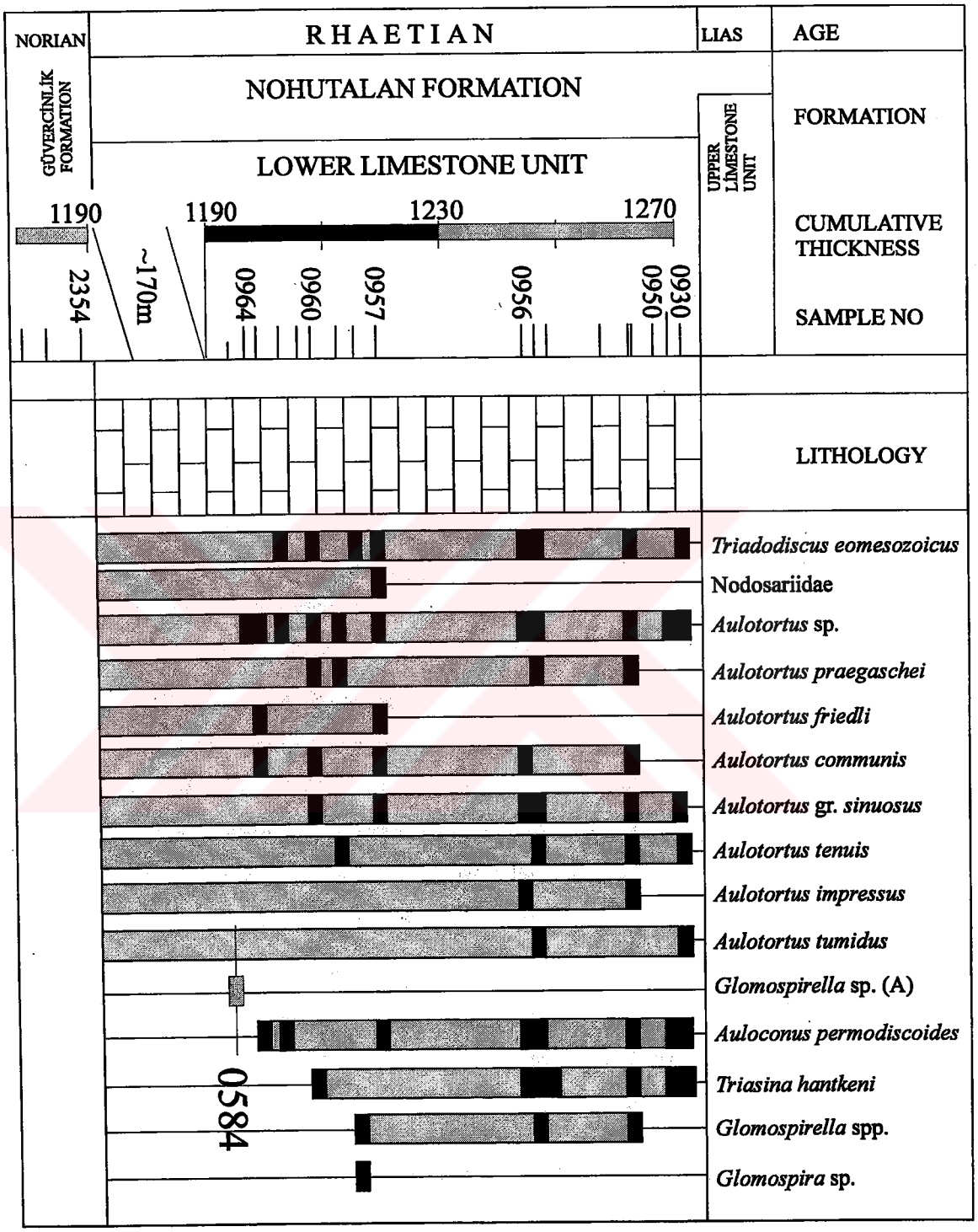


Figure 2. 25 Stratigraphic Distribution of the Foraminifers in the Lower Limestone Unit of the Nohutalan Formation (Stratotype n. 13)

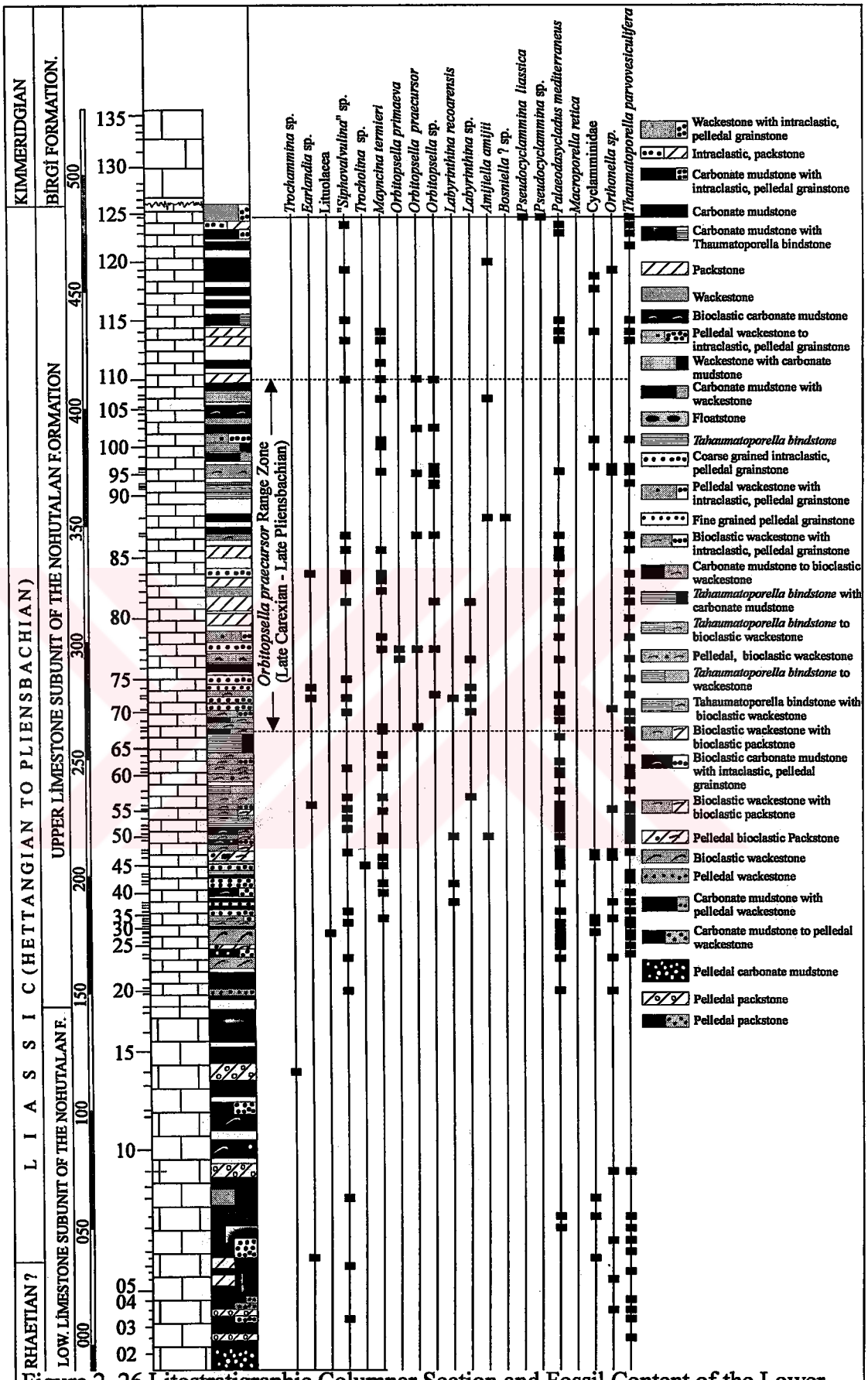


Figure 2. 26 Litostratigraphic Columnar Section and Fossil Content of the Lower and Upper limestone subunit of the Nohutalan Formation (Stratotype no. 14).

(ii) bioclastic, intraclastic pelletal wackestone; (iii) foraminifer, dasyclad algae and *Thaumatoporella*-bearing pelletal, bioclastic, intraclastic packstone, (iv) carbonate mudstone with fennestral structure, which is intercalated with stromatolitic *Thaumatoporella*-bindstone, and oncolithic grainstone.

To the south of Birgi village, on the Çeşme road, along the partial type section, the unit consists, in ascending order, of bioclastic, intraclastic, foraminifer and dasyclad algae-bearing pelletal packstone, wackestone, carbonate mudstone, packstone interlayered with bioclastic pelletal wackestone and carbonate mudstone, and bioclastic, intraclastic pelletal grainstone, and *Thaumatoporella parvovesiculifera* and *Palaeodasycladus mediterraneus*-bearing bioclastic, intraclastic pelletal packstone, and wackestone, in the upper part (Fig. 2. 24). Foraminifers, megalodontid-type lamellibranch, gastropod, ostracod, spicules of sponges, dasyclad algae, *Thamatoporella* and *Orthonella* fragments are the main bioclastic components. Fecal pellet and bioturbation structures and fenestral fillings are common in the carbonate mudstone and wackestones. The bioclastic grainstone and packstone contain poorly to well sorted, angular to subangular foraminiferal and algal components and fine to coarse-grained angular intraclasts, cemented by blocky calcite cement.

Certain topographic lows exist beneath the upper contact. The bounding lithologies could have been not recognized due to plant cover. However, similar structures occur in Tahtaiskele (Erdoğan et al., 1990), where they are defined by infillings of limy claystone, claystone or sandy terrigenous material.

2. 5. 3. 3. Contacts: The Upper limestone subunit rests conformably on the Lower limestone subunit of the Nohutalan Formation. The contact is clearly exposed in the Örendağı and Ortadağ locations. The thick-bedded, *Thaumatoporela parvovesiculifera*-rich, algal carbonate mudstone, bioclastic wackestone, and *Thaumatoporella parvovesiculfera*-bindstone of the lower limestone unit grade into the very regularly bedded limestone of the Upper limestone subunit. The unit is unconformably overlain by the Birgi Formation (Fig. 2. 27).

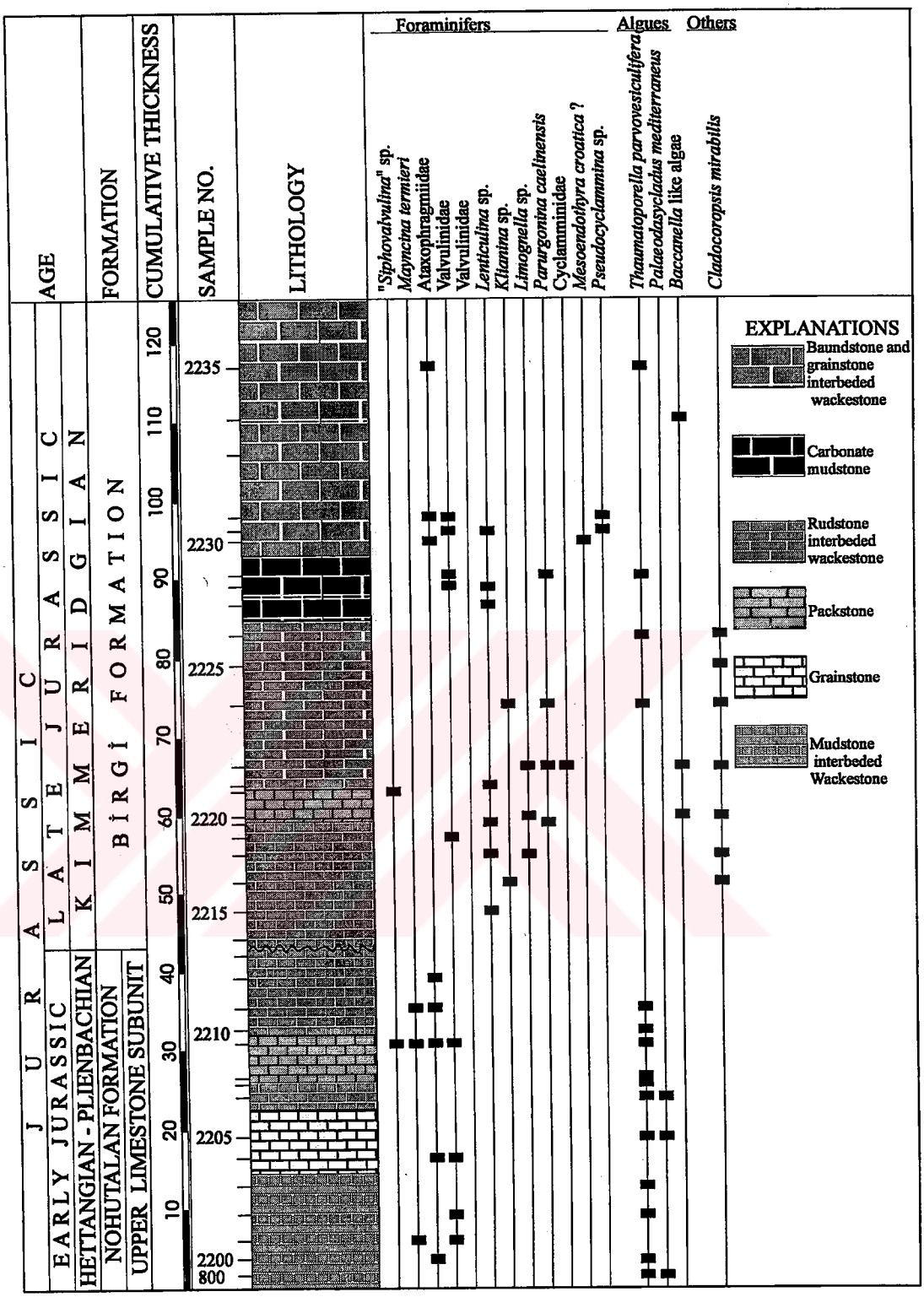


Figure 2. 27 Litostratigraphic Colomnar Section of the Contact Between Upper Limestone Unit of the Nohutalan and Birgi Formations (Stratotype no. 16).

2. 5. 3. 4. Age: To the north of the Birgi village, in the Örendağı type section (Fig. 2. 25 and 26) the subunit contains a foraminiferal assamblage of *Mayncina termieri*, *Orbitopsella praecursor* (Middle liassic, Hottinger, 1967; Pliensbachian, Bassoullet, 1996), *O. primaeva* (Middle liassic, Hottinger, 1967; Pliensbachian, Bassoullet, 1996), *Labyrinthina recoarensis* (Sinemurian, Bassoullet, 1996), *Amijiella* cf. *amijii*, *Pseudocyclammina liasica* (Late Pliensbachian-Early Toarsian, Bassoullet, 1996), *Pseudocyclammina* sp., *Labyrinthina* sp., *Bosniella*? sp., "*Siphovalvulina* sp., *Earlandia* sp., Lituolacea, and an algal assemblage of *Thaumatoporella parvovesiculifera*, *Plaeodasycladus mediterreneus* (Early to Middle Liassic, Bassoullet et al. 1978) (pl. 84, figs. 2-3, 5-6, 8-9; pl. 85, figs. 1-8), *Macroporella retica* (pl. 84, fig. 7) , *Orthonella liasina* (İşintek et al., 1998), both indicating an Early to Middle Liassic age. To the south of the Birgi village, on the Çeşme road-side type section, the lower part of the member includes foraminifers such as *Labyrinthina* cf. *recoarensis*, *Mayncina termieri*, "*Siphovalvulina* sp. *Amijiella* cf. *amijii* and algae such as *Palaeodasycladus mediterraneus* (pl. 84, figs. 2-3, 5-6, 8-9; pl. 85, figs. 1-8) which show conformable setting with those of the Örendağı type section. The *Palaeodasycladus mediterraneus* reveals a southern Tethyan origin for the Upper limestone subunit (İşintek, et al. (2000)).

2. 5. 3. 5. Remarks: The subunit corresponds to the "Liassic limestone unit" of Brinkmann et al. (1972) and to the lower part of the "Nohutalan Formation" of Erdoğan et al. (1990).

2. 6. BİRGİ FORMATION

2. 6. 1. Description: The Birgi Formation consists of dark brown to light brown, very thick-bedded to massive, *Cladocoropsis*-rich bioclastic micritic limestone. The Formation is exposed in the surroundings of Kocadağ and the eastern side of Örendağ. The representative stratotype of the Formation is situated in the Örendağı, to the northeast of the Birgi village. The partial stratotype is exposed on the Akdağ, to the northwest of Barbaros village (Fig. 2. 22).

2. 6. 2. Lithology: The *Cladocoropsis*-rich limestone includes bioclastic carbonate mudstone, algal carbonate mudstone, carbonate mudstone to wackestone, *Caladocoropsis*-rich floatstone, rare wackestone, and very rare pelletal, bioclastic grainstone. The bioclastic carbonate mudstone contains foraminifers, more or less transported algal mass or algal balls and indeterminable very fine grained bioclastic fragments (probably *Cladocoropsis* fragments), sparse spicules of sponges and sparse lamellibranch. The limestones of mudstone to wackestone composition are composed of more or less transported *Baccanella*-like algal masses, algal ball fragments, indeterminable bioclasts and foraminifers. The *Cladocoropsis*-rich floatstone includes sporadic foraminifers and abundant, more or less transported *Cladocoropsis mirabilis* clasts ranging in size from 1-2 cm to 5-6 cm. The clasts are supported by microcrystalline calcite matrix. The pelletal bioclastic grainstone is very rarely represented in the unit and contains coarse-grained intraclasts, pellets and bioclasts which are cemented by blocky sparry calcite (Fig. 2. 28).

2. 6. 3. Contacts: The Formation rests unconformably on the upper limestone subunit of the Nohutalan Formation through a stratigraphic hiatus, characterized by an oxidized surface, two bauxite lenses and limestone conglomerates derived from the underlying formation (Figs. 27 and 28) . The bauxite lenses are recognized for the first time. The contact can be traced in the Örendağı and Ortadağ localities. The patchy oxidized surface is exposed in the southwestern side of the Örendağı, Ortadağ and eastern side of the Akdağ. One of the bauxite lenses found in the Ortadağ and extends laterally 5 m and is 2-3 m wide. The other bauxite lens is recognized through abundant debris in the northeastern side of Akdağ, however, because of plant cover and faulting, its shape can not be defined. The limestones-conglomerate derived from the underlying formation occurs in the Kaplangediği location, to the south of the Kocadağ. The light brown to brown limestone clasts are lithologically similar to the underliying Liassic and/or Triassic formations. The limestone-conglomerate is grain-supported and carbonate cemented. The hiatus is represented by an erosional, truncated, irregular carbonate surface, directly covered by the Birgi Formation. The Formation is unconformably covered by the Aktepe Formation, through a bauxite-bearing surface.

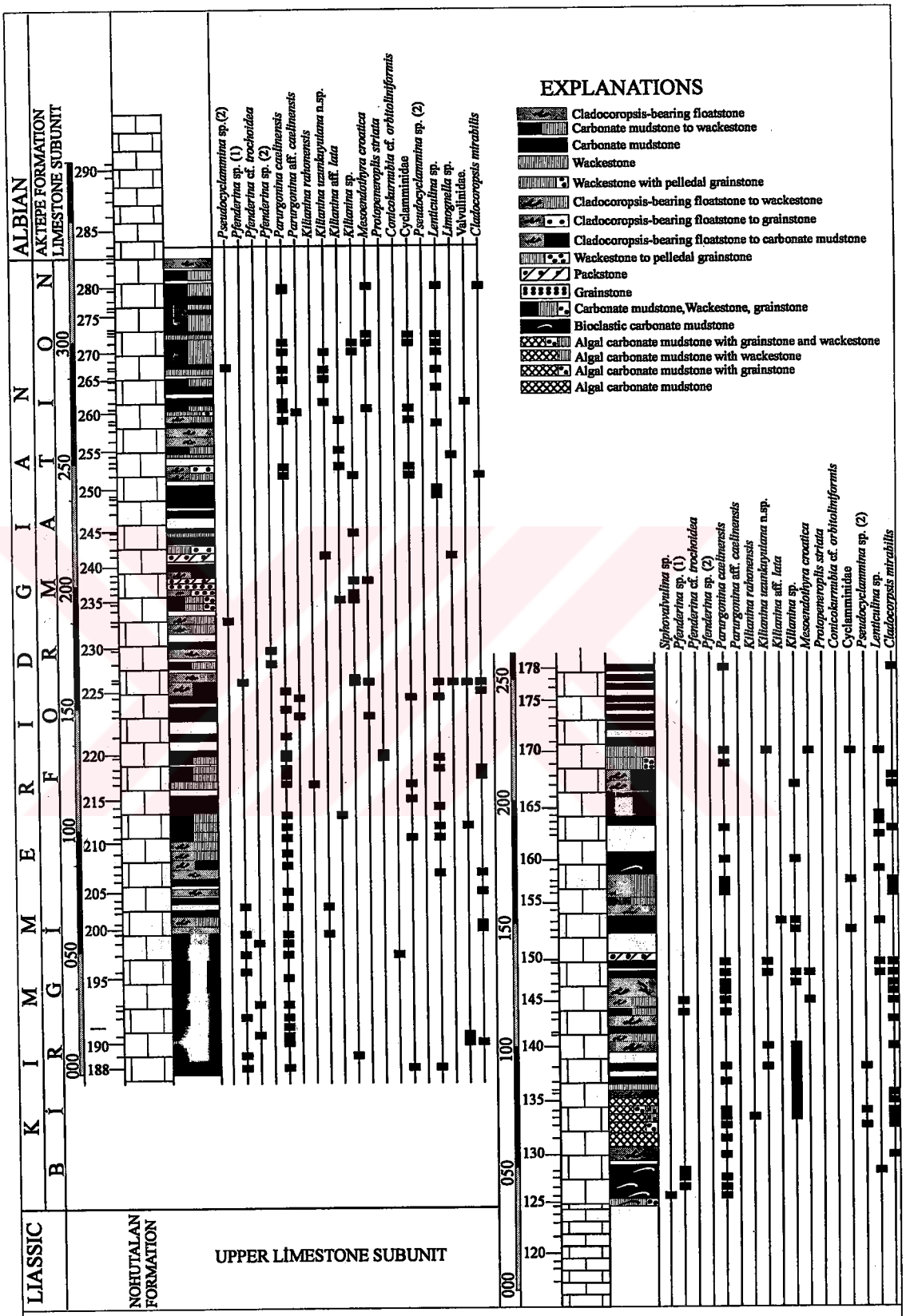


Figure.2. 28 Litostratigraphic Columnar Section and Fossil Content of the Birgi Formation In the Örendağı Stratotype (Stratotype no. 14 and 15).

2. 6. 4. Age: The Birgi Formation contains *Pfenderina* cf. *trochoidea*, *Parurgonina caelinensis* (Kimmeridgian, Cuvillier et al. (1968); Bassoullet, (1996), *P.* aff. *caelinensis*, *Kilianina rhonensis*, *K.* cf. *lata*, *Kilianina* n. sp., *Protopeneoroplis striata*, *Mesoendothyra croitica* ?, *Conicokurnubia orbitoliniformis*, *Pfenderina* sp. (1), *Pfenderina* sp. (2), *Lenticulina* sp., *Pseudocyclammina* sp., *Orthonella* sp. of Cyanophyta and *Cladocoropsis mirabilis* (pl. 87, fig. 2). The foraminiferal fauna and *Cladocoropsis mirabilis* are characteristic for the late Jurassic (Malm), however, the existence of *Parurgonina caelinensis* delimits the age of the Formation with the Kimmeridgian (Cuvillier et al. (1968); Bassoullet, (1996)), (Figs. 2. 27 and 28).

2. 6. 5. Remarks: The Birgi Formation was first described by Brinkmann et al. (1972) as the "*Cladocoropsis* Formation". The formation corresponds to the "Birgi Formation" of Draganstan and Düzbastılar (1993). Erdoğan et al. (1990) considered that the "*Cladocoropsis* Formation" of Brinkmann et al. (1972) was a part of the "Nohutalan Formation" which was characterized by a continuous limestone succession from Liassic to Albian. Dragastan and Düzbastılar (1993) used the name "Birgi Formation" which is more suitable to the "International stratigraphic nomenclature" than the "*Cladocoropsis* Formation".

2. 7. AKTEPE FORMATION

The "Aktepe Formation" (Brinkmann et al., 1972) is characterized by rudist, gastropod and foraminifer-rich limestone, limestone-conglomerate, and sandstone, clayey limestone and conglomeratic limestone and limestone. In the study, the formation is divided into the limestone subunit and the limestone-conglomerate subunit, respectively. The formation is exposed at the vicinity of the Aktepe and Karabey Sırtı in a limited area to the west of Barbaros.

2.7.1. Remarks

The "Aktepe Formation" of Brinkmann et al. (1972) consists of a lower "Foraminifer and gastropod-bearing limestone" subunit and an upper "Limestone-conglomerate-marl" subunit. The Aktepe Formation corresponds to the upper part of the Nohutalan Formation of Erdoğan et al. (1990). Erdoğan et al. (1990) considered the Aktepe Formation of Brinkmann et al. (1972) as a part of their "Nohutalan Formation" which is characterized by a continuous limestone succession from Liassic to Albian. They interpreted that the bauxite pockets were formed under subaerial conditions during Albian. In this study, since the Nohutalan Formation is separated from the underlying Birgi Formation by an extensive stratigraphic gap from Kimmeridgian to Albian; the terminology of Brinkmann et al. (1972) is adopted and lower and upper subunits are named as the limestone subunit and the limestone-conglomerate subunit, respectively.

2. 7. 2. Limestone subunit

2. 7. 2. 1. Description: The limestone subunit is characterized by light brown, reddish brown to red, rudist, gastropod and foraminifer-bearing, mainly micritic and in parts sparitic limestone. The subunit is exposed along the Karabey Sırtı and in the eastern side of the Akdağ, one kilometer west of the Barbaros village (Fig. 2. 22).

7. 2. 2. Lithology: In the Karabey Sırtı type section (Fig. 2. 29), the limestone subunit, except for its uppermost part, consists of light brown to brown, thick to very thick-bedded micritic limestone with bioclasts of lamellibrach, gastropod, rudist and foraminifer. The uppermost part of the subunit consists of reddish brown to red, thick to very thick-bedded sparitic allochemical limestone. The micritic limestone is composed of bioclastic wackestone with intercalations of bioclastic floatstone, and subordinately, intraclastic, bioclastic packstone and wackestone to bioclastic, pelletal grainstone. The bioclastic wackestone components are fragments of gastropod and lamellibranch, foraminifer, dasyclad and cyanophyte algae supported by micritic carbonate matrix. In some levels, miliolid foraminifers are extraordinarily

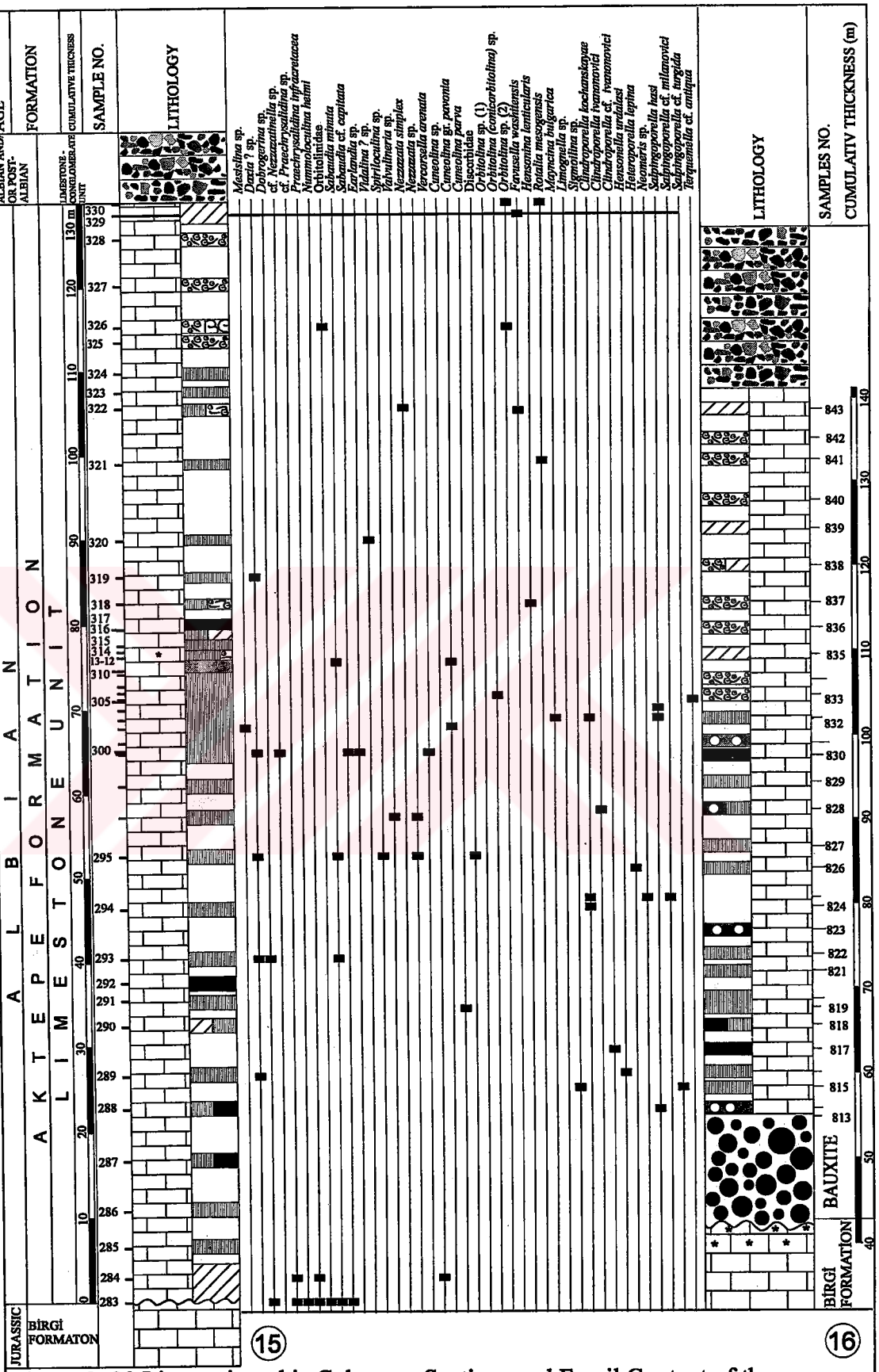


Figure 2. 29 Litostratigraphic Colomnar Sections and Fossil Content of the Limestone Subunit of Aktepe Formatıon (Stratotype no. 15 and 16) .

abundant. The bioclastic floatstone contains abundant gastropod, rudist and other lamellibranch fossils or their fragments. The wackestone to bioclastic, pelletal grainstone intercalations are very sporadic.

In the Akdağ type section (Fig. 2. 29) the unit is represented by an about 30 m succession consisting of light brown to brown, thick to very thick-bedded micritic limestone which bear lamellibrach, gastropod, rudist and foraminifer, in the lower part, and brown to light brown and reddish brown to red, thick to very thick-bedded sparitic allochemical limestone, in the upper part. The micritic limestone is composed of bioclastic wackestone with intercalations of bioclastic floatstone. The sparitic allochemical limestone is composed of packstone to grainstone with allochems of lamellibranch, gastropod, foraminifer and fragments of rudist. The fragments echinoids, ostracoda, bryozoa and very sporadically fragments of coral forms the other bioclastic components of the packstone to grainstone. The components are uniformly subrounded to rounded and poor to well-sorted in size and are bounded by sparry calcite cement which is locally micritized.

2. 7. 2. 3. Contacts: The limestone unit of the Aktepe Formation rests unconformably, both on the Kimmeridgian Birgi Formation and the Liassic Upper limestone unit of the Nohutalan Formation. In the Karabey Sırtı, the unit rests on the limestones of the Kimmeridgian Birgi Formation through a more or less irregular, truncated and oxidized surface. On the eastern side of the Akdağ, the unit overlies the Liassic Upper limestone unit of the Nohutalan Formation. In this locality, carbonate sequence is overturned and the contact is characterized by a bauxitic level, which is 300 meter in lateral extend, and 7- 8 m in thickness. The basal plane of the bauxitic level is irregular, and the top plane is approximately flat. The limestone unit is conformably overlain by the limestone-conglomerate unit, along the eastern side of the Karabey Sırtı.

2. 7. 2. 4. Age: The Limestone subunit, in both Karabey Sırtı and Akdağ type sections (Fig. 2. 29) include a foraminiferal fauna consisting of *Earlandia* sp., *Sabaudia minuta*, *S.* cf. *capitata*, *Daxia* ? sp., *Dobrogelina* sp., *Nezzazata* sp. (1),

Nezzazata sp. (2), *Nezzazata simplex*, *Nezzatatinella* sp., *Valvulineria* sp., *Spiriloculina* sp., *Massilina* sp., , *C.* gr. *pavonia*, *Cuneolina* sp., *Vercorsella arenata*, *Praechrysalidina infracretacea*,., *Pseudocyclammina rugosa*, *Pseudocyclammina* sp., *Vidalina*? sp., *Lenticulina* sp., *Orbitolina* (*Conicorbitolina*) gr. *paeneconica*, *Orbitolina* sp(1)., *Orbitolina* sp. (2), ?*Mayncina* cf. *bulgarica*, *Favusella washitensis*, Discorbidae, Orbitolinidae, Miliolidae and *Nummuloculina* (or *Pseudonummuloculina*) *heimi*, cf. *Praechrysalidina* sp., *Cuneolina parva* (Albian, Schroder & Neumann, (1985); Arnaud-Vanneau & Premoli Silva, (1995)), *Rotalia mesogeensis*, "*Hensonina*" *lenticularis*, *Orbitolina* (*conicorbitolina*) sp. (Late Albian, Schroder & Neumann, (1985); Schlaginthweit & Piller, (1990)).

The subunit also comprises an algal flora consisting of *Cylidroporella kochanskyae* (Albian- Cenomanian-Turonian, Schindler & Conrad (1994)) , *C. ivanovici*, *Hensonella urladanasi*, *Hetoroporella lepina*, *Neomeris* sp., *Salpingoporella hasi* (Albian- Cenomanian, Conrad et al. (1976); Mancinelli, (1992); Masse & Arnaud-Vanneau, (1999)), *S.* cf. *milovanovici* (Albian-Cenomanian, Masse & Arnaud Vanneau, 1999), *S.* ? cf. *turgida* (Early, Middle Albian, Mancinella, (1992)), *Terquemella* cf. *antiqua*. The above foraminiferal fauna and the algal flora, in common with rudists belonging to Radiolitidae indicate an Albian age for the subunit (Masse & İşintek, 2000). *Cylindroporella ivanovici*, *Hensonella urladanasi*, *Heteroporella lepina* and *Salpingoporella hasi* represents a Mediterranean cosmopolitic association and *Cylidroporella kochanskyae*, *Salpingoporella* cf. *milovanovici S.*? cf. *turgida* and *Terquemella* cf. *antiqua* belong to the Arabo-African association (Masse & İşintek, 2000), indicating a southern Tethyan origin for the Limestone subunit of the Aktepe Formation.

2. 7. 3. Limestone-conglomerate subunit

2. 7. 3. 1. Description: The Limestone-conglomerate subunit is characterized by light brown limestone-conglomerate, greenish lithic conglomerate and sandstone, yellowish grey clayey limestone and light grey to light brown conglomeratic limestone and limestone. The Limestone-conglomerate subunit contains clasts

derived from the Lower limestone subunit. Some limestone and conglomeratic limestone layers seem to be the sequential continuity of the underlying limestone unit. The subunit is exposed in the surroundings of Aktepe, one kilometer west of the Barbaros village.

2. 7. 3. 2. Lithology: The Limestone-conglomerate subunit mainly consists of light brown, thick to very thick-bedded limestone-conglomerate, medium to thick-bedded, greenish lithic conglomerate and sandstone, thin-bedded, yellowish grey mudstone and clayey limestone, light grey to light brown conglomeratic limestone and limestone (Fig. 2. 29). The limestone-conglomerate consists entirely of limestone pebbles and very sparsely chert and other rock fragments. Grains are subrounded and are supported by sparry calcite cement. Maximum clast size is 15 - 20 cm; average size is 2 to10 cm. The limestone pebbles are derived from the Upper Triassic to Liassic Nohutalan Formation, *Cladocoropsis*-bearing Kimmeridgian Birgi Formation and Albian Limestone unit of the Aktepe Formation. The lithic conglomerate is composed mainly of limestone clasts and subordinately of clastic rock fragments, and supported by green sand matrix. Limestone components are similar to those of the limestone- conglomerate. The sandstone includes abundant carbonate rock fragments, quartz, polycrystalline quartz, chert and very rare metamorphic and mafic volcanic rock fragments. The carbonate rock fragments are also derived from the underlying Upper Triassic to Cretaceous limestone formations. The mudstone is a few meter in thickness and includes claystone intercalations. The conglomeratic limestone is composed of angular limestone pebbles supported by micritic matrix. It may laterally change to light grey micritic limestone.

2. 7. 3. 3. Contacts: The basal limestone-conglomerate layers rest, without any erosional gap, on the limestone subunit. However, pinkish red color of underlying limestone layers may be related to sporadic subaerial conditions. The contact is exposed on the eastern side of the Karabey Sırtı, along the Barbaros-Kadıovacık road.

In the eastern flank of the Aktepe, the upper Rhaetian aged part of the Nohutalan Formation structurally rests on the Limestone-conglomerate unit. Although the contact is not well exposed, another Rhaetian to Liassic aged segment of the Nohutalan Formation rests both on the Rhaetian aged structural slice of the Nohutalan Formation and Limestone unit of the Aktepe Formation (Figs. 2. 22 and 23).

2. 7. 3. 4. Age: Although the Limestone-conglomerate unit does not contain fossils in its matrix, abundant limestone pebbles contain orbitolinid foraminifer similar to that of the Limestone subunit, suggests an Albian and/or post-Albian age for the subunit.

2. 8. STRUCTURAL PROPERTIES OF THE MESOZOIC FORMATIONS

The main structural elements of the study area are thrust faults and folds. There are also some structural slices bounded by the thrust faults which cannot be laterally followed. The slices belonging to the older Camiboğazı Formation are bounded by the younger Güvercinlik Formation.

2. 8. 1. Thrust faults

There are five major thrust faults in the study area, which are named as Hanaylı, Kadıovacık, Nohutalan, Aktepe and Çukuralanüstü thrust faults (Fig. 2. 2). However, due to the similar lithology and parallelism between the layers of the overlying and the underlying blocks, it is difficult to recognize these faults in the field at first sight.

The Hanaylı thrust fault is located to the east of Hanaylı Tepeleri and extends in SW-NE direction (Fig. 2. 6). The fault is recognized by the presence of the older Saplazdağı Member of the Camiboğazı Formation on the younger Hanaylı Member of the Camiboğazı Formation and on the Güvercinlik Formation. The fault contains crushed zones in parts, particularly where the Saplazdağı Member overthrusts the Hanaylı Member.

The Kadıovacık thrust fault is situated to one and a half kilometers NE of Kadıovacık village, and extends in SW-NE direction (Fig. 2. 6). The fault is recognized by the presence of the older Hanaylı Member on the younger Güvercinlik Formation, and by the occurrence of the crushed zones along the fault.

The Nohutalan thrust fault is situated to the west and north of Nohutalan village as two segments cut by a vertical fault (Fig. 2. 7). The two segments extend in SW-NE and almost E-W directions. The fault is recognized by the presence of the older Gerence Formation on the younger Upper limestone subunit of the Nohutalan Formation to the west of the village, and by an abrupt overthrust of older Saplazdağı and Hanaylı members and Güvercinlik Formation on the younger Lower limestone unit of the Nohutalan Formation.

The Aktepe thrust fault is situated on the western flank of Aktepe (Fig. 2. 22). The fault is present as two segments. The fault is recognized by the presence of the older Lower limestone subunit of the Nohutalan Formation on the younger Limestone-conglomerate subunite of the Aktepe formation. The second segment is recognized by the presence of the Lower and Upper limestone subunits on the younger Lower limestone subunit of the Nohutalan Formation.

The Çukuralanüstü thrust fault bounds the older Hanaylı Member resting on the younger Güvercinlik Formation in Çukuralanüstü location (Fig. 2. 6).

2. 8. 2. Folds

There are three main folds in the study area (Fig. 2. 2). These are Bahçeli, Akdağ and Karabey Sırtı folds.

The Bahçeli fold is located about 4 kilometer northwest of Kadıovacık village. It is a syncline and its western flank is inversed (Fig. 2. 6). The Akdağ fold is located on the eastern side of Akdağ. It is a syncline and its western flank is inverse (Fig. 2. 22). The Karabey Sırtı fold is located on the Karabey Sırtı. It is a anticline and is partly inverse (Fig. 2. 22).

CHAPTER THREE

BIOSTRATIGRAPHY

The biostratigraphical zones are described for the Triassic and the Lower Jurassic formations. The names of the zones are adopted from the literature, if available, and some of them are modified. However some new biozones were established according to the results of this study. Biozones are named by using North American Stratigraphical Code (NASC).

3.1. TRIASSIC

Six biozones are differentiated for the Triassic formations (Fig. 3. 1). Three of them are introduced in this study for the first time. The biozones are as follow:

1. ***Glomospira densa-Meandrospira dinarica* concurrent range zone**

Nomenclature: The zone is introduced here for the first time.

Boundaries: The lower boundary of the zone is marked by the first occurrence of *G. densa*, and the upper boundary is marked by the last appearance of *M. dinarica*, respectively (Fig. 3. 1).

Stratigraphic range: Middle Anisian (Pelsonian).

Remarks: The age of the zone is also supported by the occurrence of *Paulbronnimania judicariensis* in the same interval. The zone is characterized by dacyclad algae-rich limestones alternating with "Ammonitico rosso" type, nodular limestone and limestone conglomerates.

The Zone include a foraminiferal assamblage consisting of *Arenovidalina amylovoluta*, *A. chialing chiangensis*, *Triadodiscus eomesozoicus*, Duostominidae, *Meandrospira cheni?*, *Meandrospira pusilla*, *Glomospira praedensa*, *Glomospirella grandis*, *Glomogallerium mlavicencis*, *Karaburinia* ? sp., *Karaburunia triadica* (ex

PRE MIDDLE TRIASSIC AND / OR MIDDLE TRIASSIC | M I D D L E - L A T E T R I A S S I C | L A T E T R I A S S I C

PRE MIDDLE ANISIAN AND / OR MIDDLE ANISIAN | MIDDLE ANISIAN | MIDDLE, LATE ANISIAN | LATE ANISIAN - LADINIAN | LADINIAN / CARNIAN | CARNIAN-NORIAN | NORIAN | RHAETIAN

GERENCE FORMATION | C A M İ B O Ğ A Z I F O R M A T I O N | HANAYLI MEMBER | GÜVERCİNLİK FORMATION | NOHUTALAN FORMATION

L A L E K Ö Y M E M B E R | S A P L A Z D A Ğ I M E M B E R | LOWER LIMESTONE SUBUNIT

0 m 40 80 90 90 100 140 180 220 260 300 340 380 420 460 540 580 620 660 700 740 760 800 840 880 920 960 1000 1040 1080 1120 1140 1150 1190 1190 1230 1270

1070 1071 1072 1073 1075 1076 7m 1080 1077 1083 1090 1095 1096 1097 1100 1105 1110 1115 1120 1125 1129 1135 1140 1150 1155 1160 1165 1170 1175 1180 1185 1190 1195 1200 1205 1210 1215 1220 1225 1230 1235 1240 1245 1250 1255 1260 1265 1270 1275 1280 1285 1290 1295 1300 1305 1310 1315 1320 1325 1330 1335 1340 1345 1350 1355 1360 1365 1390 1445 1455 1460 1465 1470 1480 1485 1490 1495 1500 1505 1506 2305 2310 2315 2325 2330 130m 2335 2345 2346 2347 2350 2354 170m 1960 1960 1956 1957 1956 1930 1930

Arenovidalina amilovoluta
Arenovidalina chialingchiangensis
Arenovidalina sp.
Triadodiscus eomesozoicus (A)
Endotebanella spp.
Ataxophragmtid Foraminifera
Nodosariidae
Duostominidae
Meandrospira chen
Meandrospira dinarica
Meandrospira pusilla
Glomospira praedensa
Glomospira densa
Glomospirella grandis
Glomogallerum mlavicensis
Karaburinia ? sp.
Karaburinia triadica (ex. Sigmotilina)
Ophthalmidium tricki
Ophthalmidium exiguum
Turrispirillina sp.
Endoteba controversa
Endoteba ex. gr. obturata
Trochammina sp.
Duostominid Foraminifera (A)
Duostominid Foraminifera (B)
Un known Foraminifera (A)
Endotebanella pentacamerata
Trochammina cf. almtalensis
Paulbronnimannia judicariensis
Cornuspira ? sp.
Ophthalmidium sp.
Endotriada sp.
Duostominid Foraminifera (C)
Endotebanella sp. (A)
Un known Foraminifera (B)
Earlandia tintiniformis
Reophax sp.
Duostominid Foraminifera (D)
Endotebanella sp. (C)
Endotebanella sp. (B)
Un known Foraminifera (D)
Glomogallerum gazdzickii
Endoteba badoxi
Ophthalmidium spp.
Endotriada spp.
"Textularia" n. sp.
Aulotortus sinuosus praegsoides
Reophax sp. (A)
Ammobaculites sp.
Palaeolituonella primativa n. sp.
Lamelliconus cf. biconvexus
Endotriadella spp.
Reophax sp. (B)
Reophax sp. (C)
Reophax sp. (D)
Austrocolomia sp.
Variastoma sp.
Meandrospira ? sp.
Meandrospira deformata
Aulotortus sp.
Turriglomina magna
Turriglomina mesotriasica
Duostominid Foraminifera (E)
Lamelliconus multispirus
Reophax sp. (E)
Un known Foraminifera (C)
Earlandia amplimuralis
Lamelliconus procerus ?
Paraophthalmidium sp.
Palaeolituonella meridionalis
Endotebanella kocaeliensis ?
Lamelliconus ventroplanus
Turriglomina sp.
Lamelliconus sp.
Galeanella ? sp.
Paulbronnimella cf. whittakeri
Endotriadella wirzi
Turriglomina scandonei
Endotebanella or Ammobaculites sp.
Gandinella sp. aff. G. falsofriedli
Aulotortus praegaschei
Aulotortus friedli
Agathammina ? tranica
Glomospira sp. aff. G. rosetta
Lamelliconus procerus
Gandinella falsofriedli
Aulotortus communis
Aulotortus gr. sinuosus
Aulocomus sp. ?
Aulotortus tenuis
Ophthalmidium sp. (A)
Duostominid Foraminifera (F)
Aulotortus impressus
Aulotortus tumidus
Glomospirella gr. expansa
Foraminifera n. gen. n. sp.
Aulotortus or Glomospirella sp.
Ophthalmidium sp. (B)
Agathammina austroalpina
Glomospirella n. sp.
Triasina oberhauseri
Glomospirella sp. (A)
Aulocomus parmodiscoides
Triasina hantkeni
Glomospirella spp.
Glomospira sp.

(Mid. Anisin (Pelsonian)) *Meandrospira dinarica* Concurent Range zoze

(Mid. Anisian-Late Ladinian (Pelsonian-Longobardian)) *Turriglomina mesotriasica* Range zoze

(Ladinian-Carnian) *Triadodiscus eomesozoicus* Partial Range zoze

(Early Norian) *Aulotortus communis* Interval zoze

(Middle Norian) *Triasina oberhauseri Range* zoze

(Rhaetian) *Triasina hantkeni Range* zoze

Figure 3. 1 Stratigraphic Distrubition of the Foraminifers and Biozones of the Triassic Formations.

Sigmoilina), *Ophthalmidium tricki*, *Ophthalmidium exiguum*, *Turrispirillina* sp., *Endoteba contraversa*, *Endoteba* ex. gr. *obturata*, Unknown foraminifer A, *Endotebanella pentacamerata*, *Trochammina* cf. *almtalensis*, *Paulbrönnimannia judicariensis*, **Cornuspira** ? sp., *Ophthalmidium* sp., *Endotriada* sp., *Endotebanella* sp., *Endotebanella* sp. A, Unknown foraminifer B, *Earlandia tintiniformis* and *Reophax* sp.

2. *Turriglomina mesotriassica* range zone

Nomenclature : The zone was introduced by Salaj et al. (1988) as a range-zone for Illirian-Cordevolien substages.

Boundaries: The lower and the upper boundaries of the zone are marked by the first and last occurrences of *T. mesotriassica,* respectively (Fig. 3. 1).

Stratigraphic range: Pelsonian-Cordevalien.

Remarks: Although Salaj (1988) suggested the zone for the Illirian-Cordevalien time interval, Rettori (1995) recorded a Pelsonian-Cordevalien age for *T. mesotriassia.* The results of this study also support Rettory (1995)'s suggestion. Therefore, the age of the zone is suggested as Pelsonian-Cordevalien. The zone is characterized by relatively deep outer platform type micritic limestones.

The Zone includes following foraminiferal assamblage consisting of *Arenovidalina amilovoluta*, *A. chialingchiangensis*, *Triadodiscus eomesozoicus*, *Endotebanella* spp., *Glomospirella grandis*, *Ophthalmidium exiguum*, *Endoteba badoxi*, *E.* ex. gr. *obturata*, *Earlandia tintiniformis*, *Paulbrönnimella* cf. *whittakeri*, *Endotiadella wirzi*, *Turriglomina scandonei*, *Aulotortus sinuosus pragsoides*, *Lamelliconus multispirus*, *L. ventroplanus*, *L.* cf. *biconvexus*, *L. procerus*?, *Lamelliconus* sp., *Turriglomina magna*, *T. mesotriasica*, *Earlandia amplimuralis*, *Paraophthalmidium* sp., *Palaeolituonella meridionalis*, *Endotebanella kocaeliensis*, *Paulbrönnimella* cf. *whittakeri*, *Endotiadella wirzi*, *Endotriada* spp., *Endotriadella* spp., *Turriglomina* sp., *Austrocolomia* sp., *Variostoma* sp., *Reophax* sp. A, B, C, E, *Reophax* sp., *Paleolituonella primativa* n. sp., *Ophthalmidium* spp., *Aulotortus* sp., *Galaenella* ? sp., Duostominid Foraminifera A, C, E, Doustominidae, Nodosariidae and unknown foraminifer C.

3. *Triadodiscus eomesozoicus* partial range zone

Nomenclature: The zone is introduced here for the first time.

Boundaries: The lower boundary of the zone coincides with the last occurrence of *Turriglomina mesotriassica*, and the upper boundary is marked by the first appearance of *Aulotortus communis*, respectively (Fig. 3. 1).

Stratigraphic range: Ladinian-Carnian.

Remarks: Pre-Middle and/or Middle Anisian to Rhaetian aged *Triadodiscus eomesozoicus* is found together with *T. mesotriassica* and *Aulotortus communis* and is present through the defined interval. The zone is characterized by lagoonal biostromal-biohermal limestones.

The Zone includes following foraminiferal and algal assamblage consisting of *Arenovidalina amilovoluta*, *A. chialingchiangensis*, *Triadodiscus eomesozoicus*, *Endotebanella pentacamerata*, *E. kocaeliensis*, *Endotebanella* or *Ammobaculites* sp., *Endoteba badouxi*, *E.* ex. gr. *obturata*, *Endotebanella* sp., *Lamelliconus* cf. *biconvexus*, *Lamelliconus* sp., *Turriglomina scandonei*, *Turriglomina magna*, *Turriglomina* sp., *Palaeolituonella meridionalis*, *Palaeolituonella primativa* n. sp., *Gandinella* sp. aff. *G. falsofriedli*, *Aulotortus praegaschei*, *A. friedli*, *Aulotortus* sp., *Agathammina ?iranica*, *Ophthalmidium* spp., *Endotriada* spp., *Endotriadella* spp., *Reophax* sp. (C), *Variostoma* sp., *Reophax* sp. (E), *Paraophthalmidium* sp., Nodosariidae, Duostominidae, Duostominid Foraminifera (C), and (D), Unknown foraminifer (C) and (D), *Diplopora anulata* (pl. 78, figs. 1-5), *Diplopora nodosa* (Pl. 79. figs. 2-5), *Teutloporella ?* sp. (Pl.76, figs. 6-7).

4. *Aulotortus communis* interval zone

Nomenclature: The zone is introduced here for the first time.

Boundaries: The lower boundary of the zone is marked by the first occurrence of *Aulotortus communis*, and the upper boundary coincides with the first appearance of *Triasina oberhauseri*, respectively (Fig. 3. 1).

Stratigraphic range: Early Norian.

Remarks: The lower boundary of the zone is defined by the first occurrence of *A.communis* which is Norian-Rhaetian in age, in common consent. In the literature,

some species of *Lamelliconus* such as *L. biconvexus, L. ventroplanus, L. multispirus* and *L. procerus* were suggested to be Carnian in age, and their probable occurrence in Norian was recorded. Here, their co-occurrence with *A.communis* proves a Carnian-Norian age for them. On the other hand, Salaj (1988) established a *Gandinella falsofriedli* interval zone and suggested a latest Alaunian-Sevatian (latest Norian-Early Rhaetian) age for the zone. However, *Gandinella falsofriedli* is found together with *A. communis* in the Early Norian, thus its range should be extended to Early Norian. The zone is characterized by shallow water, inner platform carbonates.

The Zone includes following foraminiferal and algal assamblage consisting of *Arenovidalina amilovoluta, Triadodiscus eomesozoicus, Lamelliconus multispirus, L.* cf. *biconvexus, L. ventroplanus, L. procerus, Lamelliconus* sp., *Palaeolituonella meridionalis, Gandinella* sp.aff. *falsofriedli, Aulotortus friedli, A. praegaschei, A. communis, A.* gr. *sinuosus, A. tenuis, A. impressus, A. tumidus, Aulotortus* sp., *Glomospira* sp. aff. *rosetta, Gandinella falsofriedli, Glomospirella* gr. *expansa, Agathammina austroalpina, Auloconus* sp.?, *Variostoma* sp., *Endotebanella* or *Ammobaculites* sp., *Ophthalmidium* sp., (A) and (B), *Reophax* sp. (E), *Ophthalmidium* spp., Nodosariidae, Duostominidae, Duostominid foraminifer (D) and (F), Unknown foraminifer (D), and *Teutloporella herculae* (Pl. 76, Figs. 5-8), *Clypeina* sp. cf. C. *besici* (Pl. 84, Figs 1-4), *Physoporella pouciforata* var. *undulata* (Pl. 82, Figs. 3-5), *P. pouciforata* var. *sulcata* ? (Pl. 83. Fig. 1), cf. *Poikiloporella dublicata* (Pl. 83. Fig. 4), *Teutloporella* ? sp (Pl. 76, Fig. 6).

5. *Triasina oberhauseri* range zone

Nomenclature : The zone was first introduced by Gazdzicki (1983) as a partial-range zone for Norian. Then by Salaj et al. (1983) as *Semiinvolutina clari* and *Triasina oberhauseri* assemblage subzone for upper Alaunian and by Salaj et al. (1988) as *Triasina oberhauseri* interval zone.

Boundaries: The lower and upper boundaries of the zone coincide with the first and the last occurrences of *Triasina oberhauseri*, respectively (Fig. 3. 1).

Stratigraphic range: Middle Norian.

Remarks: The zone is characterized by dolomitic and stromatolitic limestones intercalating with claystones.

The Zone includes following foraminiferal assamblage consisting of *Aulotortus communis*, *A. tenuis*, *A. gaschei, Triadodiscus eomesozoicus*.

6. *Triasina hantkeni* range zone

Nomenclature: The zone was first introduced by Salaj (1969) for the Rhaetian of Western Carpathians. The Late Sevatian-Rhaetian age was proved by Vegh-Neubrandt (1972) in Hungary, by Bycticky and Jendre-Jakova (1977) in Slovakia and by Bordea at al. (1978) in Romania. Salaj et al. (1988) redescribed the zone with a latest Sevatian-Rhaetian range.

Boundaries: The lower and upper boundaries of the zone coincide with the first and the last occurrences of *Triasina hantkeni,* respectively (Fig. 3. 1).

Stratigraphic range: Middle-Late Rhaetian.

Remarks: The zone is characterized by restricted shallow-water, inner carbonate platform limestones.

The Zone includes following foraminiferal assamblage consisting of *Aulotortus communis*, *A. friedli*, *A. praegaschei*, *A. tenuis*, *A. siniosus sinuosus*, *A.* ? *impressus*, *Auloconus* permodiscoides, Glomospirella sp.? and *Glomospira* sp.

3.2. JURASSIC

***1. Orbitopsella praecursor* range zone**

Nomenclature: The zon is introduced here for the first time.

Boundaries: The lower and upper boundaries of the zone coincide with the first and the last occurrences of *Orbitopsella praecursor*, respectively (Fig. 2. 26).

Stratigraphic range: late Early to early Late Pliensbaschien (Late Carexien-Early Domerien)

Remarks: Bassoullet (1996) recorded the same age for *Orbitopsella praecursor and* suggested an Early Carexien age for *Orbitopsella primaeva.* However, in

Karaburun Peninsula both forms are found together in the Upper Carexien formations. The co-occurence of Hettangian to Pleinsbaschien aged algae, *Paleodacycladus mediterraneus* together with *Orbitopsella praecursor* and *Orbitopsella primaeva* also supports the suggested age.

The Zone includes following foraminiferal and algal assamblage consisting of *Mayncina termieri*, *O. primaeva*, *Labyrinthina recoarensis*, *Amijiella* cf. *amijii*, *Pseudocyclammina liasica*, *Pseudocyclammina* sp., *Labyrinthina* sp., *Bosniella*? sp., "*Siphovalvulina*" sp., *Earlandia* sp., *Thaumatoporella parvovesiculifera*, *Plaeodasycladus mediterreneus* (Pl. 84, Figs. 2-3, 5-6, 8-9; Pl. 85, Figs. 1-8), *Orthonella* sp.

CHAPTER FOUR

CARBONATE PETROGRAPHY, FACIES AND ENVIRONMENT

4.1. PETROGRAPHICAL AND MICROFACIES ANALYSIS

The Mesozoic sequence is investigated from the viewpoint of (i) allochem content, (ii) faunal and floral content, (iii) matrix features, (iv) primary and secondary sedimentary structures, (v) textural features (vi) diagenetical features, and (vii) textural microfacies.

The results of the above mentioned investigations on the Mesozoic aged Gerence Formation; Laleköy, Saplazdağı and Hanaylı members of the Camiboğazı Formation, the Güvercinlik Formation; Lower and Upper Limestone subunits of the Nohutalan Formation, Birgi Formation, and Lower limestone and Limestone-conglomerate subunits of the Aktepe Formation are presented in the tables. 4. 1, 2, 3, 4, 5, 6, 7, 8, 9 and 10, respectively (see appendix). Composition of the above mentioned tables are based mainly on the petrographic and microfacies analysis studies on the carbonate rocks of Schott (1984) and Stauffer (1962). The number of investigated components to be used in commenting the petrographical and environmantal features, presented in the tables were increased after Wilson (1975), Flügel (1978 & 1981, 1982), Tucker et al. (1990), Piller, (1981), Schafer & Senowbari-Daryan (1981), Bradner & Resch (1981) and Turnsek (1981). Terminology of carbonate microfacies is adopted from Dunham (1962), amplified by Embry & Klowan (1971).

4.2. ENVIRONMENTAL ANALYSIS

The environmental analysis of the Mesozoic formations are based on the results obtained from the presented petrographical and microfacies investigations. The environments suggested for the Triassic, Jurassic and Cretaceous formations are presented below and in figures 4. 1, 2, 3 and 4, respectively. Standard facies belt used in above mentioned figures, and evidences of facies belts given below, adopted from Wilson (1975) and Flügel (1981).

4. 2. 1. Gerence Formation

The Gerence Formation is dominantly deposited in the i) basinal, ii) open sea shelf to deep shelf margin and iii) foreslope environments (Fig. 4. 1; Table 4. 1). The basinal facies of the Gerence Formation is reperesented by generally red, locally green-colored, thin-bedded, laterally continuous chert horizones. The open sea shelf is characterized by dark-grey to grey, thin to medium-bedded Radiolaria-rich and thiny pelecypod-bearing (Pl. 1, fig. 3, 7) carbonate mudstone and wackestone. The deep shelf margine facies is represented by medium-bedded limestone with local micritic matrix and spary calcite cement, including moderately abundant tiny intraclastic and bioclastic components, rare transported gastropod and bivalvia fragments. The deep sea shelf to deep shelf margin facies is characterized by laminated to medium-bedded radiolaria and thiny flament-bearing, carbonate mudstone to wackestone, silty and sandy carbonate mudstone (Pl. 1. fig. 5) , mudy limestone, mudstone alternations and red colored ammonit and transported bioclast-bearing nodular limestone. Foreslope facies is represented by thick-bedded, rare intraclast and bioclast-bearing oolitic grainstone (Pl. 1, fig. 1-2, 4) or foraminifer and transported dasyclad algae-bearing intraclastic grainstone, reworked intraclastic and intraformational limestone-conglomerate (Table 4. 1). Vertical distribution of the presented facies belts reflect a depositional environment for the Formation which varies between open sea shelf to deep shelf margin, rarely deep basin. The facies sporadically changes to deep basinal and relatively shallow, high energy foreslope conditions towards the upper part of the Formation.

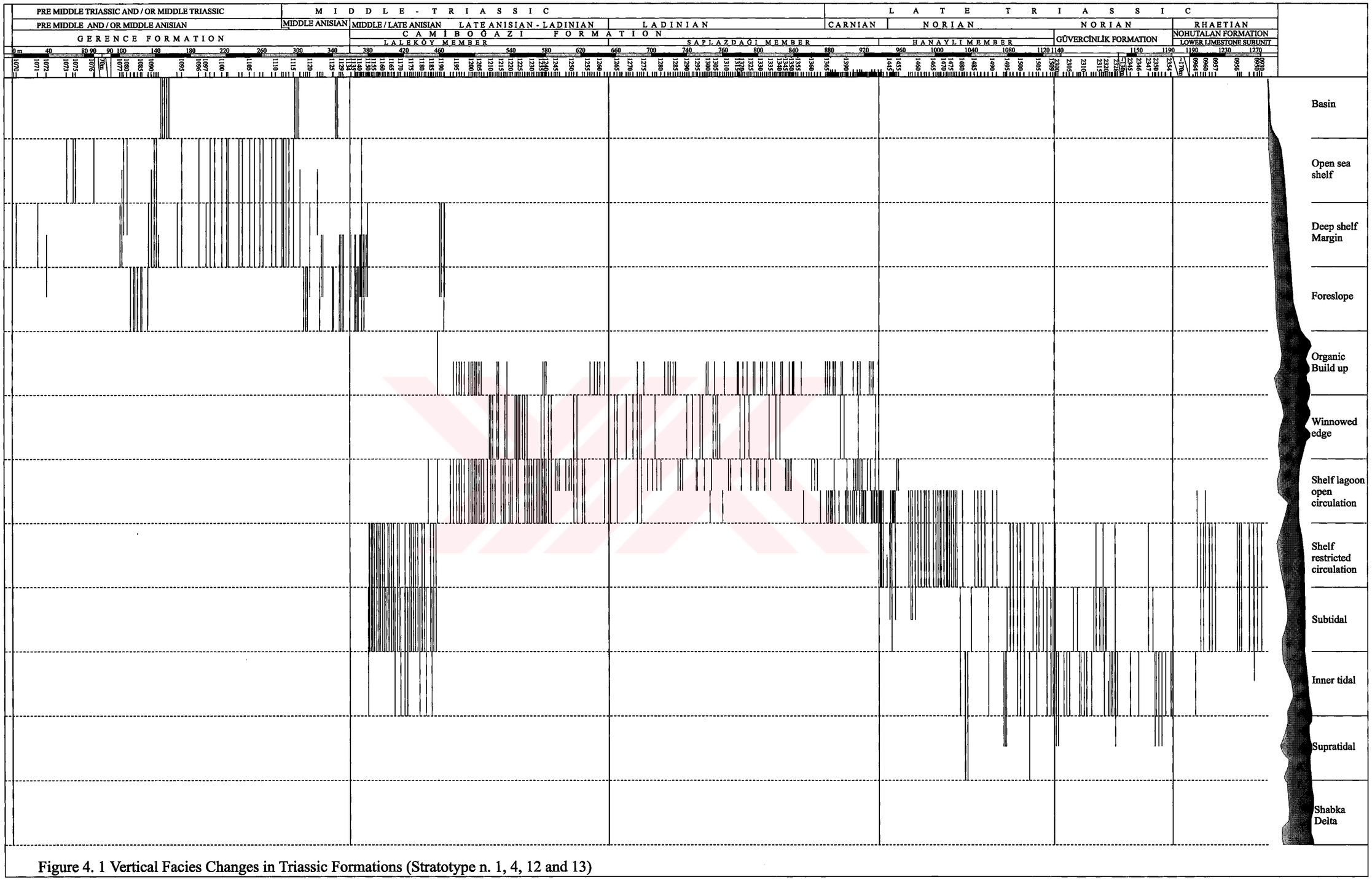


Figure 4. 1 Vertical Facies Changes in Triassic Formations (Stratotype n. 1, 4, 12 and 13)

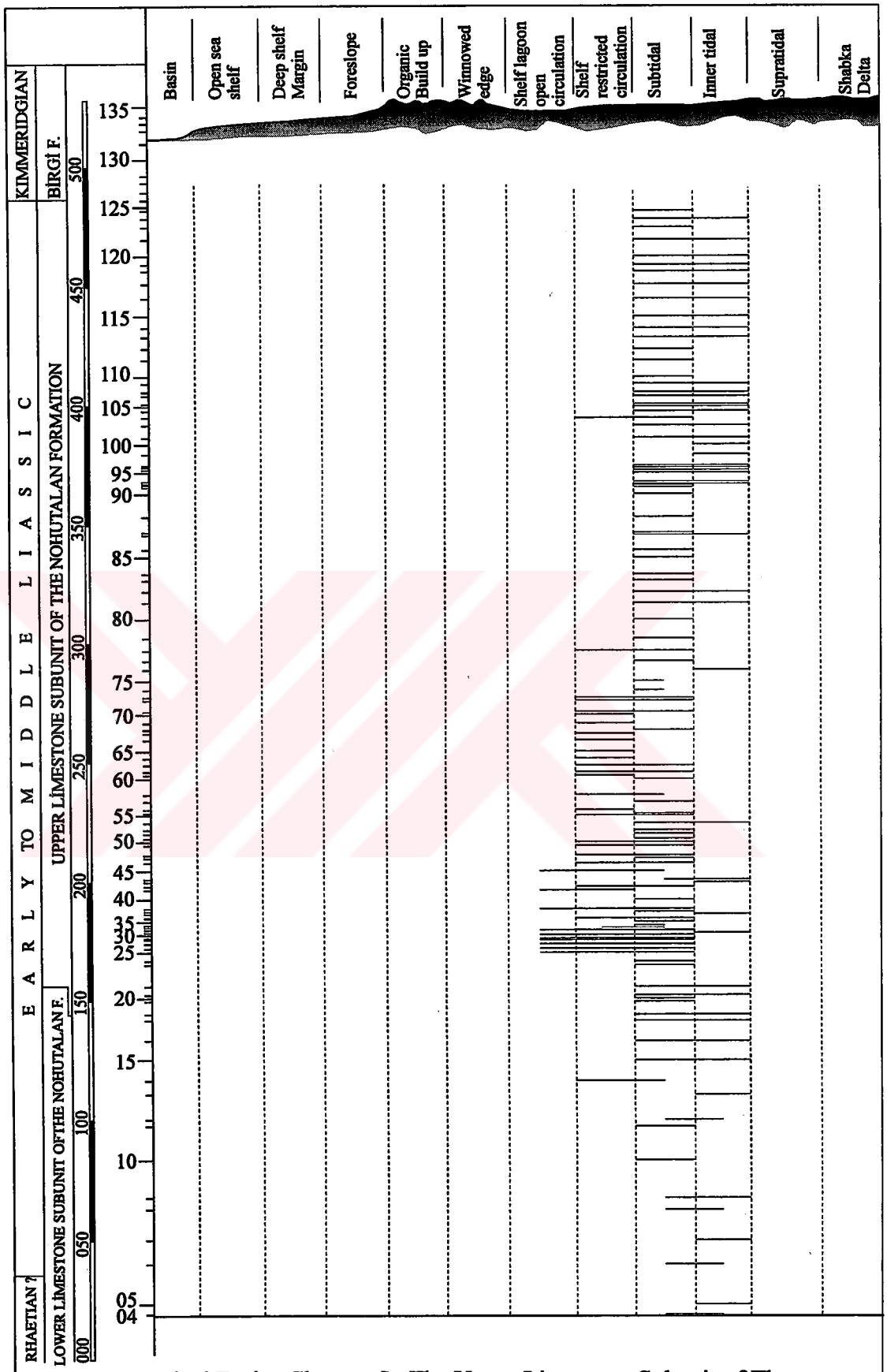


Figure 4.2 Vertical Facies Changes In The Upper Limestone Subunit of The Nohutalan Formation (Stratotype no. 14).

T.C. YÜKSEKÖĞRETİM KURULU
DOKÜMANTASYON MERKEZİ

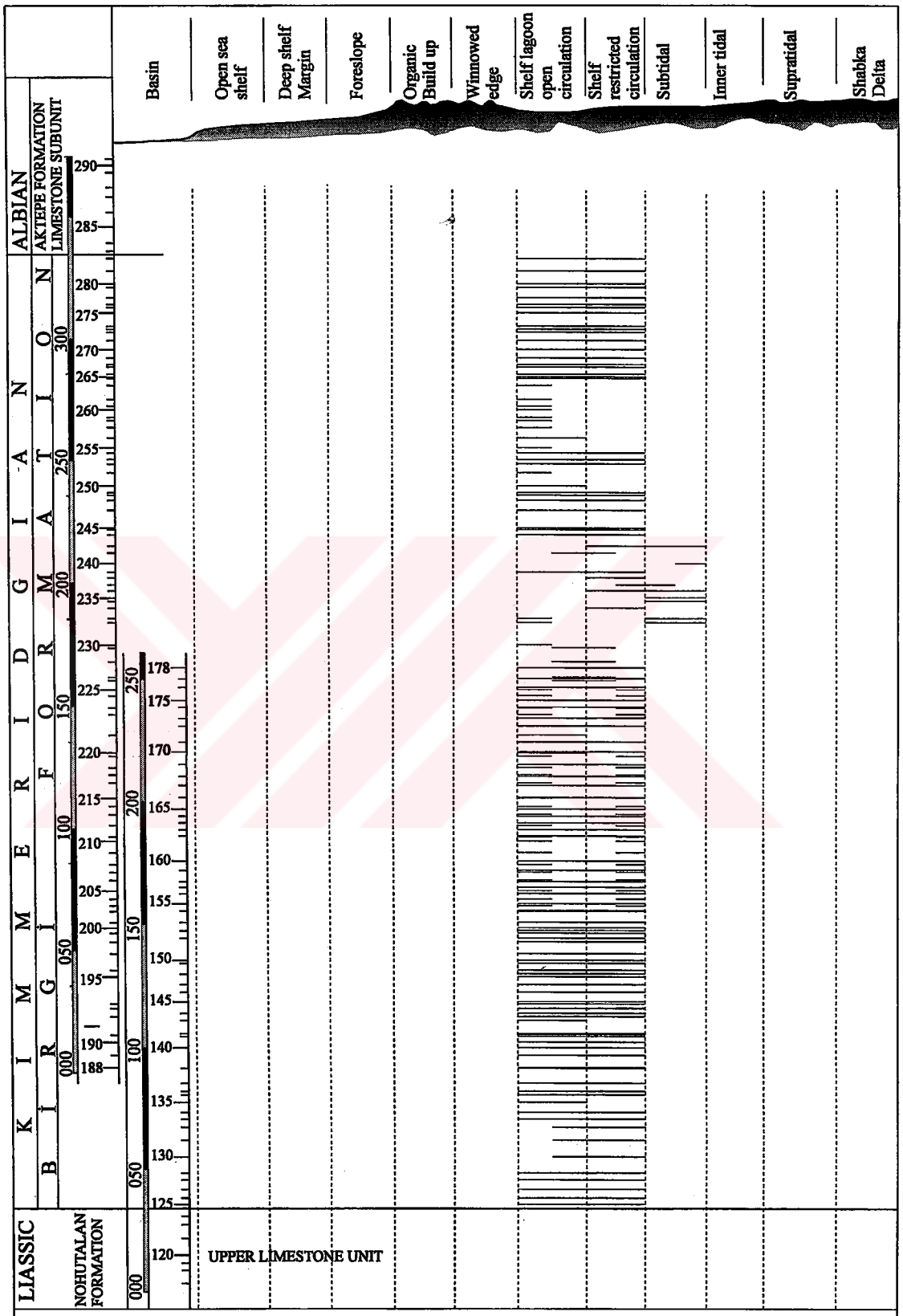


Figure 4.3 Vertical Facies Changes in the Birgi Formation (Stratotype n. 14 and 15).

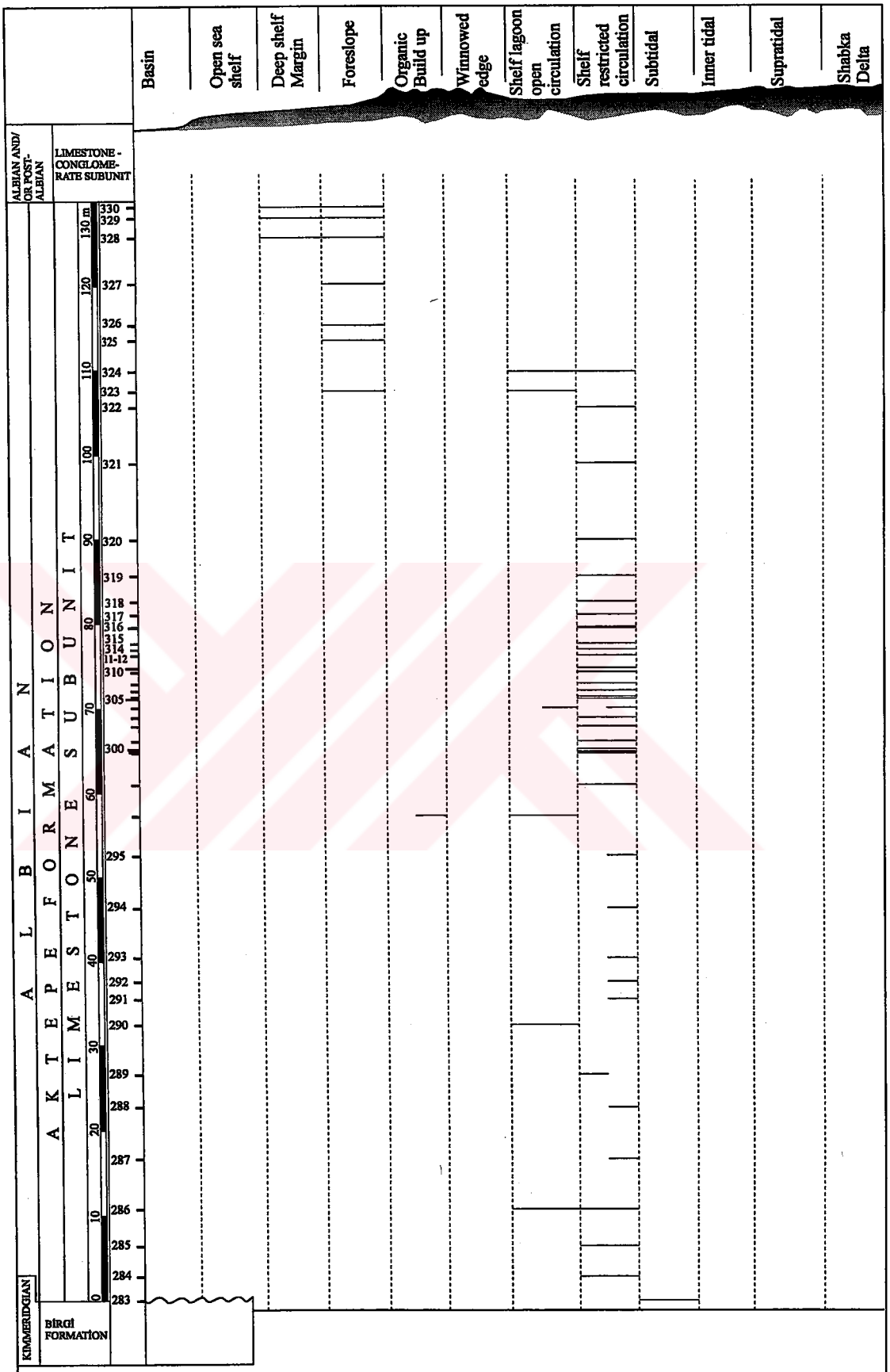


Figure 4. 4 Vertical Facies Changes in the Aktepe Formation (Stratotype no. 15).

4. 2. 2. Laleköy member of the Camiboğazı Formation

The Laleköy member is represented by i) open sea shelf to deep shelf margin ii) deep shelf margin to foreslope, iii) foreslope, iv) restricted circulation shelf to subtidal, v) subtidal to inner tidal, vi) organic build up to open circulation shelf lagoon, vii) winnoved edge and viii) organic build up belts (Fig. 4. 1; Table 4. 2).

The open sea shelf to deep shelf margin belt is reflected by abundant ammonit, Radiolaria and thin valved pelecypods within the carbonate mudstone. The deep shelf margin to foreslope belt is characterized by medium to thick-bedded, laminated, ammonit (Pl. 1, fig. 6), thin flament, spicule of sponge, crinoidal fragment and rare Radiolaria-bearing, bioclastic carbonate mudstone. The foreslope belt is characterized by intraclastic, bioclastic pebbly limestone consisting of packstone to grainstone microfacies with rare foraminifera and moderate transported dasyclad algae. The restricted circulation shelf to subtidal belt is represented by laminated to thick-bedded intraclastic, pelletal and bioclastic grainstone facies including rare to moderate lamellibranch, gastropod, ostracod, crinoidal fragment, foraminifer and dasyclad algae fragments (Pl. 2, figs. 1-3). The subtidal to inner tidal belt is characterized by intraclastic, pelletal and bioclastic, algal (*Cayeuxia* fragments, Pl. 3, fig. 2) grainstone to pelletal wackestone alternations, including rare fenestral filling and algal carbonate mud (Pl. 2, fig. 4). Bioclastic components of the belt are very rare to rare lamellybranch, gastropod fragments and foraminifer.

The organic build up to open circulation shelf lagoon belt is represented by biostromal algal bindstone (Pl. 2, figs. 6-7); coral and sponge-bearing (Pl. 3, fig. 1), crustal algae and organic detritus-bearing framestone (Pl. 3, figs. 1, 7) ; and organic detritus-rich algal framestone to grainstone microfacies (Pl. 2, fig. 5). Both biostromal algal bindstone and coral and sponge-rich framestone facies may include inner framework cavities filled by radial fringing spary calcite cement, and very rare to rare lamellibranch, gastropod and foraminifer. Algal framestone to grainstone facies includes intraclatic pelletal organic carbonate mud detritus in its intra-frame cavities which may reflect open circulation shelf lagoon belt. The winnowed edge

belt may be characterized by the abundance of the coarse to fine grained detritus material drived from the organic build up formations. However algal crustal formations which accompanie with the organic detritus may reflect the facies is near to open shelf lagoon conditions. The organic build up belt may be decribed by biostromal coral and sponge (Pl. 4, fig. 2) formations bounded with crustal algae and foraminifer. *Tubyphytes* sp. (Pl. 3, figs. 3, 6), *Microtubus babai* (Pl. 4, fig. 1), *Celyphia* sp. (Pl. 4, fig. 4), *Ceyenzia* sp. (Pl. 4, fig. 6) *Solenelmia manon manon* (Pl. 3, fig. 4), *Baccinella ordinata* (Pl. 3, fig. 7) which are determinated by Prof. Dr. Baba Senowbary-Daryan (Erlangen) are of main organic build up components of the organic build up belt. The Laleköy member of the Camiboğazı formation displays an enviromental evolution from deep sea margin to foreslope, foreslope to subtidal and inner tidal in its lower and middle parts. This stage reflects the development of a carbonate slope forming a base for the carbonate platform. Towards the top, a carbonate platform represented by biostromal organic build up belt and open circulation shelf lagoon environment, develops.

4. 2. 3. Saplazdağı member of the Camiboğazı Formation

The Saplazdağı member of the Camiboğazı Formation is precipeted in the i)lagoon side of the organic build up, ii) winnowed edge and iii) open circilaton shelf lagoon facies belts (Fig. 4. 1; Table 4. 3).

The organic build up belt is characterized by biostromal coral and sponge (Pl. 5, Fig. 1, 4; Pl. 4, Fig. 2) formations bounded with crustal algae and crustal foraminifera. Rare bryozoa (Pl. 5, fig. 6), lamellibranch, gastropod, foraminifer and dasyclad algae are other bioclastic components of the facies. *Tubyphytes* sp., inozoid sponge (Pl. 4, fig. 5, 7), *Solenelmia manon manon* (Pl. 4, Fig. 3), *Baccinella ordinata* (Pl. 3, Fig. 5) determined by Prof. Dr. Baba Senowbary-Daryan (Erlangen) are the components of the organic build up belt. The winnowed edge belt can be determined by abundance of coarse to fine grained detritus material drived from organic build up characterized by algal bindstone to intraclastic, pelletal grainstone. However, accompanying crustal algal formations indicate that the facies is close the open shelf

lagoon conditions. Very rare to rare foraminifer and algal fragments are the bioclastic components. The open circulation shelf lagoon belt is characterized by coral and sponge-bearing biostromal algal bindstone, foraminifer-bearing, dasyclad algae-rich - such as *Diplopora annulata*- packstone to floadstone and organic detritus-bearing algal framestone to grainstone microfacies. Limestones belonging to each facies belt include large inner framework cavities reflecting organic build up effects, filled by radial fringing spary calcite cement.

4. 2. 4. Hanaylı member of the Camiboğazı Formation

The Hanaylı member is commonly characterized by i) open circulation shelf lagoon to restricted circulation carbonate shelf, ii) restricted circulation carbonate shelf to subtidal, rarely iii) subtidal to inner tidal and iv) inner tidal to supratidal facies belts (Fig. 4. 1; Table 4. 4). The open circulation shelf lagoon to restricted circulation carbonate shelf belt is represented by the existence of coral, and dasyclad alg fragment derived from a reef; the abundance of megalodontid type pelecypod and involutinid foraminifera, and the bioclastic grainstone to packstone depositional texture. The restricted circulation carbonate shelf to subtidal belt can be recognized by the increasing ratio of wackestone to packstone facies and the presence of smaller gastropod, fecal pellet and bioturbation. The subtidal to inner tidal facies is characterized by the increasing ratio of the pelletal wackestone to packstone facies with bioturbation and fennestral filling. Existence of sporadic clayey dolomitic algal mud facies may indicate inner tidal to supratidal facies belt.

4. 2. 5. Güvercinlik Formation

Initial part of the Güvercinlik Formation is represented by beach sandstone and/or clayey dolomitic carbonate mudstone and dolomite deposited in beach conditions and very shallow inner tidal to supratidal facies. The Formation is generally represented by i) subtidal, ii) inner tidal, iii) rarely restricted circulation shelf to subtidal and iv) inner tidal to supratidal facies belts (Fig. 4. 1; Table 4. 5).

The subtidal facies belt is characterized by the intraclastic to bioclastic packstone to grainstone facies and the existence of involutinid foraminifera. Inner tidal facies belt is represented by the carbonate mud facies generally consisting of algal stromatolitic laminae with widespread bioturbation structures and fennestral filling. Restricted circulation shelf to subtidal belt can be determined by abundace of intraclastic, bioclastic to pelletal wackestone to packstone and wackestone to grainstone facies with abundant involutinid foraminifer and rare dasyclad algae. The inner tidal to supra tidal belt may be represented by the existence of thick dolomite, clayey dolomite and red to yellow claystone beds.

4. 2. 6. Lower limestone subunit of the Nohutalan Formation

In its partial stratotype section (stratotype no, 13) (Fig. 4. 1; Table 4. 6), the Lower limestone subunit of the Nohutalan Formation is represented by restricted circulation shelf to subtidal facies belt charecterized by bioclast, pellet and intraclast-bearing carbonate mudstone to wackestone, wackestone to bioclastic pelletal packstone facies. Abundant involutinid foraminifera, rare small gastropod and lamellibranch and rare bioturbation structures may reflect the restricted circulation to subtidal facies belt. The abundance of megalodontid type bivalvia and Dasyclad algea in some horizones, may indicate open circulation shelf lagoon facies belt. Some limestone beds consisting of algal carbonate mud to intraclastic pelletal grainstone with abundant fenestral filling and bioturbation structures reflect inner tidal facies.

The uppermost part of the subunit (stratotype no. 13) containing algal carbonate mud facies with fennestral filling and pelletal grainstone intercalations, indicate the inner tidal to sporadic supratidal facies belts. In the Örendağı stratotype (stratotype no 14; Fig. 4. , 2; Table 4. 7) the very poor foraminiferal content, the abundance of algal carbonate mud and *Thaumatoporella parvovesiculifera* bindstone facies may reflect very shallow water restricted circulation self lagoon environment. In the uppermost part of the subunit, the existence of *Palaeodasycladus mediterreneus-*

bearing wackestone intecalations may represent open circulation shelf lagoon facies belt.

The lower and middle parts of the subunit which are not presented in the figures, are characterized by the alternations of the thick-bedded, involutinid foraminifera and dasyclad algea- bearing limestone, megalodontid type bivalvia-bearing dolomitic limestone and laminated to irregular fennestral filling-bearing algal stromatolitic limestone, indicating an open circulation self lagoon to tidal flat facies belt.

4. 2. 7. Upper limestone subunit of the Nohutalan Formation

The Subunit is represented by i) open circulation shelf lagoon to subtidal, ii) restricted circulation shelf to subtidal, iii) subtidal, and iv) subtidal to inner tidal facies belts (Fig. 4. 2; Table 4. 7).

The open circulation shelf lagoon to subtidal belt is characterized by bioclast-rich, intraclast and pellet-bearing, wackestone with dasyclad algea, *Thaumatoporella*, oncoid, rare to moderate megalodontid type bivalvia and gastopod, sporadically fennestral filling and bioturbation structures. The restricted circulation shelf to subtidal facies belt is represented by the wackestone to packstone and packstone to icntaclastic, bioclastic, pelletal grainstone, and is recognized by abundant foraminifer, rare lamellibranch and gastropod, moderate to abundant algal components, rare fenestral filling and bioturbation structures. The subtidal facies belt is characterized by bioclastic, intraclastic and pelletal wackestone to packstone with oncoids, moderate to abundant foraminifer and algal components. It can be distinguished by moderate fenestral filling and bioturbation structures. The subtidal to inner tidal facies belt is represented by bioclastic algal carbonate mud, bioclastic, pelletal wackestone, intraclastic bioclastic and pelletal packstone to grainstone. It can be recognized by abundant algal carbonate mud, and rare to abundant fennestral fillings and bioturbation structures. The inner tidal facies belt is represented by bioclastic algal carbonate mudstone including moderate to abundant fenestral filling and bioturbation structures.

4. 2. 8. Birgi Formation

The Birgi Formation is represented by i) open circulation shelf lagoon ii) open circulation shelf lagoon to restricted circulaton shelf and sporadically iii) subtidal facies belts (Fig. 4. 3; Table 4, 8). The open circulation shelf lagoon facies belt is characterized by bioclastic carbonate mudstone, wackestone and *Cladocoropsis* fragment-rich floadstone. It can be recognized by abundant to very abundant, coarse sponge fragment and spicules, and foraminifer content, reflecting open shelf lagoon conditions. The open circulation shelf lagoon to restricted circulaton shelf facies belt is represented by bioclastic carbonate mudstone and wackestone. It can be distinguished by abundant fine *Cladocoropsis* fragments and sponge spicules, rare foraminifer and moderate algal build up formations. The subtidal facies belt can be recognized by carbonate mudstone and wackestone including local intraclastic to pelletal grainstone mass.

4. 2. 9. Limestone subunit of the Aktepe Formation

The Subunit is represented by i) subtidal, ii) restricted circulation shelf iii) restricted circulation shelf to open circulation shelf lagoon, iv) open circulation shelf lagoon, v) open circulation shelf lagoon to organic buil up, vii) foreslope and vi) foreslope to deep shelf margin facies belts (Fig. 4. 4; Table 4. 9).

The subtidal facies belt is represented by pelletal, bioclastic packstone facies including very abundant foraminifer, moderate lamellibranch and rare dasyclad algea. Abundance of the pelletal detritus derived from the carbonate mud may indicate the subtidal facies. The restricted circulation shelf facies belt is characterized by the bioclastic, pelletal packstone and bioclastic wackestone including abundant foraminifer, miliolin foraminifera and thin-valved lamellibranch. The restricted circulation shelf to open circulation shelf lagoon facies belt is recognized by bioclastic wackestone including abundant rudist fragment and foraminifera.The open circulation shelf lagoon facies belt is represented by the packstone (rudstone) to wackestone (floadstone) facies rich in coarse rudist fragment. The open circulation

shelf lagoon to organic build up facies belt is represented by bioclastic wackestone (floadstone) with abundant foraminifera and coarse rudist fragment. The facies laterally changes to rudist-rich rudstone and/or laterally discontinuous biostromal build up formations which may be interpreted in favor of the open circulation shelf lagoon to organic build up facies belt. The foreslope facies belt is characterized by bioclastic wackestone to grainstone including abundant subrounded to rounded rudist, echinoid and Bryozoa fragments and Orbitolinid foraminifera. The foreslope to deep shelf margin facies belt is represented by the bioclastic packstone to grainstone consisting of transported bioclast. Bioclastic components of the facies are rounded, fairly sorted rudist, gastropoda and Bryozoa fragments; orbitolinid foraminifera and pelagic foraminifera such as *Favusella wachitensis*. The last facies belt indicates a transgression in the upper part of the unit.

CHAPTER FIVE

SYSTEMATIC PALEONTOLOGY

6. 1. TRIASSIC

TRIASSIC TAXONOMY

FUSULININA WIDEKIND, 1937

Parathuramminacea BYKOVA, 1955

Moravamminidae POKORNY,1951

Earlandiinae CUMMINGS, 1951

Earlandia PLUMMER, 1930

Earlandia amplimuralis (PANTIC, 1972) ZANINETTI, 1976

Pl. 8, fig. 1.

1971 / 72 *Aeoliosaccus amplimuralis* Pantic, Pl. 2, figs. 69.

1975 *Aeoliosaccus amplimuralis* Borza, Taf. IV, fig. 1.

1976 *Earlandia amplimuralis* Zaninetti, Pl. 3, figs, 14-18.

Material: In the Laleköy member of the Camiboğazı Formation, sample no. 1193

Description: Test has long cylindrical and tubular shape, and is straight or slightly curved in the form of "S". The early stage of test is not discernible. Wall is made up of dark-coloured microgranular calcite, and is thick. Aperture is located at the open end of the tube and is simple.

Comparison: Morphologic aspects of the *Earlandia amplimuralis* (pl. 8, fig. 1) show similarities to *E. tintiniformis* (pl. 8, figs. 2-3, 4) and *Earlandia gracilis* (pl. 8,

fig. 7) from the viewpoint of the shape of the test; and undivided, simple tubular inner structure. However, the form differs from *E. tintiniformis*, in having a thicker wall. It can be differentiated from *E. gracilis* by its larger diameter of tube and thicker wall.

Age: Borza (1975, tav. IV, fig. 1) reported a Middle to Late Triassic age for the *Aeliosaccus amplimuralis*. To Zaninetti (1976, Pl. 3, figs. 1416) *E. amplimuralis* is found in the Late Anisian to Ladinian time interval.

Earlandia tintiniformis (MISIK, 1971) BRÖNNIMANN & ZANINETTI, 1972

Pl. 8, figs. 2-4.

1971	*Aeoliosaccus tintiniformis* Misik, pl. 1, figs. 16, fig. 1.
1972	*Aeoliosaccus tintiniformis.* Misik, pl. 12, figs. 15, 6; fig. 3.
197?	*Aeoliosaccus* sp. Misik, pl. 11, figs. 3, 4.
1972 a	*Earlandia tintiniformis*. Brönnimann & Zaninetti (not illustrated)
1792	*Earlandia tintiniformis*. Brönnimann, Zaninetti & Bozorgnia, pl. 3, figs. 15, 7, 10
1975	*Aeoliosaccus tintiniformis* Borza, Tav. IV, fig. 57.
1976	*Earlandia amplimuralis* Zaninetti, Pl. 3, figs, 20.

Material: In the Laleköy member of the Camiboğazı Formation, sample no. 1132, 1183 and 1234.

Description: Test has a long cylindrical and tubular shape, and is slightly curved in form of "S". It consists of a globular proloculus (Pl. 8, fig. 4) and tubular undivided second chamber. Wall is made up of dark-coloured microgranular calcite, and is thin. Aperture is located at the open end of the tube and is simple.

Comparison: The *Earlandia tintiniformis* (pl. 8, figs. 2-4) differs from *E. amplimuralis* (pl. 8, figs. 1) in having a thinner wall. Its tube diameter is greater than that of *E. gracilis* (pl. 8, fig. 7).

Age: Borza (1975, pl. IV, fig. 57) reported existence of the form in Norian. Misik (1972) noted that the form is found in Anisian, Ladinian and Norian rocks of the Germany and Carpathian. Brönnimann et al. (1972) indicated the occurrence of the form in the Middle Triassic Elika Formation of north Iran. To Zaninetti (1976, Pl. 3, fig. 20) *E. tintiniformis* is Early to Late Triassic in age.

Earlandia gracilis (PANTIC, 1972) ZANINETTI, 1976

Pl. 8, fig. 7.

1971-72 Aeolisaccus gracilis Pantic, pl. 2, fig. 10.

1976 *Earlandia gracilis* Zaninetti, pl. 3, figs. 17, 21, 22.

Material: Camiboğazı stratotype section sample no. 1706, thin section no. 1706, pelletal biomicritic limestone;

Description: Test is a long, slender cylindrical and tubular in shape, and is straight or very slightly curved in form of "S". The early stage of test is not discernible. Wall is made up of dark-coloured microgranular calcite, and is very thin. Aperture is located at the open end of the tube and is simple.

Comparison: The *Earlandia gracilis* (Pl. 8, Fig.7) differs from *E. amplimuralis* (pl. 8, figs. 1) in having a thinner wall and smaller tube diameter. Its tube diameter is smaller than that of *E. tintiniformis* (Pl. 8, fig. 24).

Age: Borza (1975, pl. IV, fig. 1012) reported existence of *Aeliosaccus gracilis* in Middle and Upper Triassic. To Zaninetti (1976, Pl. 3, fig. 17, 21, 22) *E. gracilis* is Ladinian in age.

Endothracea BRADY, 1884

Endotebidae VACHARD, MARTINI, RETTORI & ZANINETTI, 1994

Endoteba (VACHARD & RAZGALLAH, 1988) VACHARD, MARTINI, RETTORY & ZANINETTI, 1994

Endoteba controversa VACHARD & RAZGALLAH, 1988

Pl. 8, fig. 8, pl. 20, figs. 7, 9.

1982 *Endothyra* sp. Tuzcu et al., pl. 2, fig. 4.

1988 *Endoteba controversa* Vachard & Razgallah, pl. 1, figs. 1-24.

1989 *Endoteba controversa* Vachard & Miconnet, pl. 2, fig. 7.

Material: Gerence Formation, The Narlıcak stratotype section, sample no. 1115, thin section no. 1115B, bioclastic wackestone; Saplaz member of the Camiboğazı Formation, sample no. 785, thin section no. 785, bioclastic packstone; sample no 765 and thin section no. 765, bioclastic packstone.

Description: The equatorial view is elliptical in shape. The test consists of a globular proloculus and planispirally coiled chambers. Numbers of whorls are two and a half. Numbers of chambers are eleven. Sizes of the chambers gradually increase towards the last chamber. The chambers are separated by evident septa strongly inclined towards the following chamber. The thick wall is made up of dark-coloured microgranular carbonate and thickness of the wall gradually and clearly increases towards the open end of the test. Aperture is on the last chamber and connections between chambers are provided by interiomarginal openings against the periphery of the preceding whorls.

Comparison: The *Endoteba controversa* (pl. 8, fig. 8, pl. 20, figs. 7, 9) differs from *Endoteba badouxi* (pl. 9, fig. 46, 8), and *E.* ex. gr. *obturata* (Pl. 8, figs. 56, 910; pl. 9, fig.1.) in having a thicker wall which increases in thickness towards the last chamber. The form is differentiated from genus *Endotiriada* (pl. 12, figs. 4, 69, pl. 13, figs. 15, 79) by its relatively thicker wall which is characteristic for the genus *Endoteba* (Vachard et al. 1994).

Age: Vachard & Razgallah (1988) reported the existence of the form in Late Permian of Tunisia. Vachard & Micon (1989) also noted that the form is found in the Permian rocks of Yugoslavia, Afghanistan, Japan and Western Italy. Vachard et al. (1994) suggested an age from Permian to Rhaetian to the form, in the Tethys region.

Endoteba* ex. gr. *obturata (BRÖNNIMAN & ZANINETTI, 1972) emend, VACHARD, MARTINI, RETTORI & ZANINETTI, 1994

Pl. 8, figs. 5-6, 9-10; pl. 9, fig.1.

1972 *Endothyra obturata* BRÖNNIMAN & ZANINETTI, pl. 5, figs. 47; fig. 11A-M in text.

1976 *Endothyra obturata* ZANINETTI, pl. 8, figs. 3134.

1982 *Endothyra* sp. TUZCU et al., pl. 2, fig. 10.

1983 *Endothyra brassica* (TRIFONOVA), SALAJ et al., pl. 38, fig.6.

1989 *Endothyra* cf. *badouxi*, VACHARD, pl. 44, fig. 68.

Material: The Gerence Formation, sample no. 1115; The Laleköy member of the Camiboğazı Formation, sample no. 1137, 41, 1145, 1146, 1153, 1157, 1172, 1180, 1186 and 1192. The Saplazdağı member of the Camiboğazı Formation, sample no. 1340 and 1386.

Description: The equatorial view is circular; the axial view is elliptical and slightly biumbilical in shape. Planispiral coiling shows slight deviation of coiling axis in the departure. The form consists of subglobular chambers divided by thick septa. Chambers are increasing in size towards the last chamber. The wall consists of dark-coloured agglutinated calcite and is thick.

Comparisons: The *Endoteba* ex. gr. *badouxi* differs from *E.* gr. *controversa* and *E. obturata* with its smaller size and thicker wall. The form can be differentiated from species of genus *Endotriadella* by its thicker wall.

Age: Vachard et al. (1994) reported that the *E. badouxi* is found in Late Anisian to Carnian in the central and Western Europe and in China. In this study the form is also Anisian to Carnian in age.

Endoteba badouxi (Zanınettı & BrÖnnımann in ZANINETTI, BrÖnnıman & Baud, 1972)

Pl. 9, fig. 4-6, 8.

1972 *Endothyra badouxi* ZANINETTI & BRÖNNIMANN, in ZANINETTI et al., pl. 1, figs. 18, ?9, 1018, ?19, ?20, 21,22, ?23, ?24, ?25; pl. 10, figs. 3, ?7; pl. 11, figs. 57.

1973 *Endothyra* ex gr. *badouxi*, BRÖNNIMANN, CADET & ZANINETTI, pl. 48, fig. 48.

1976 *Endothyra badouxi*, ZANINETTI, pl. 4, fig 5.

1994 *Endoteba* ex gr. *badouxi* VACHARD, MARTINI, RETTORI & ZANINETTI, pl. 1, figs. 47.

Material: In the Laleköy member of the Camiboğazı Formation, sample no. 1141, 1197 and 1203, thin section no. 1203 and sample no. 1225, in the Saplazdağı member of the Camiboğazı Formation, sample no. 1307, 1364 and thin section no. 1364.

Description: Test is coiled. The coiling is nearly planispiral and slightly oscillates in first few whorls. Proloculus is not distinct. Coiled chambers which are divided by thick septa, are subglobular. The septa are inclined towards the following chamber. Size of the chambers increases in growth direction. Wall is made up of microgranular calcite. It is thick and simple.

Comparison: The test size of the *Endoteba badouxi* (Pl. 9, figs. 46, 8) (between 348-580 microns) is generally greater than those of *E. obturata* (Pl. 8, fig.5-6, 9-10; pl.9, fig. 1) (between 220-454 microns) and *E. controversa* (419 micron). Wachard *et al.* (1994) emphasized that *E. badouxi* is greater than the *E.* gr. *controversa* (700-800 microns, in contrary to 570-615 microns). The individuals found in this study are much smaller than the samples of the Vachard et al. (1994).Thus, the size of test may not be important in the differentiation of the species. However, the form differs from

the species mentioned above, in having whorls gradually and distinctly increasing in height and lower chambers.

Age: Zaninetti (1976) reported that *Endothyra badouxi* is found in Anisian in the Alps and Dinarids. Vachard et al. (1994) noted the form is Late Anisian to Carnian in age in Western and central Europe and China.

Endotebanella VACHARD, MARTINI, RETTORI & ZANINETTI, 1994

Endotebanella pentacamerata (SALAJ, in SALAJ, BIELY &BISTRICKY, 1967)

Pl. 9, figs. 2, 7; pl. 10, fig. 4

1967 *Endothyranella pentacamerata* SALAJ, in SALAJ, BIELY &BISTRICKY, pl. 1, fig. 10.

1970 *Endothyranella cf. tricamerata*, PANTIC, Pl. 3, fig. 1.

1976 *Endothyranella pentacamerata*, ZANINETTI, pl. 4, fig. 10.

2000 *Endotebanella pentacamerata*, İŞİNTEK & ALTINER, pl. X, fig. xx.

Material: In the Gerence Formation, sample no. 1115, 1120 and in the Laleköy member, sample no. 1352.

Description: Test is made up of two stages (pl. 9, fig. 2, 3). The first stage is circular in shape, in its equatorial oblique view. It is represented by a probably globular proloculus and two planispirally coiled whorls. The first whorl consists of six subglobular chambers. Although section orientation allows us to observe only six chambers, the second whorl may include more than six chambers. The size of subglobular chambers of the first stage rapidly increases in growth direction. The second stage is uncoiled, long, straight and cylindrical in shape. It consists of uniserial; slightly inflated subglobular chambers which are gradually increasing in size with growth. The chambers are separated by septa which are semicircular in shape. Tubular openings in the centre of septa connect chambers (Pl. 9, fig. 7). Both wall and septa are made up of thick, dark-coloured microgranular calcite.

Comparison and remarks: *Endotebanella pentacamerata* shows similarities to *E. pentacamerata* (pl. 4, fig. 10), with respect to planispirally coiled first stage including two whorls, well developed uniserial stage and slightly inflated subglobular chambers of the stage. The form differs from *E. kocaeliensis*, *Endotebanella* sp. A (Pl. 10, fig. 2), B (Pl. 10, fig. 3) and C (Pl. 10, fig. 5-7) in having well developed first stage and slightly inflated and subglobular chambers of second stage, which are gradually increasing in size.

Endotebanella kocaeliensis (DAGER, 1978) VACHARD, MARTINI, RETTORI & ZANINETTI, 1994

Pl. 10, fig. 1

?1977	*Endothyranella* sp. Gazdzicki & Smit, pl. 8, fig. 9.
1978 a	*Endothyranella kocaeliensis* Dağer, pl. 1, figs. 11, 12.
1978 b	*Endothyranella kocaeliensis*, Dağer, pl. 1, fig. 21(reprint of holotype).
1980	*Endothyranella kocaeliensis*, Dağer, pl. 1, fig. 21.
1994	*Endotebanella kocaeliensis* Vachard, Martını, Rettorı & Zanınettı, pl. 3, figs. 2, 3; fig. 2B.
2000	*Endotebanella* cf. *kocaeliensis*, İşintek & Altıner, pl. 1, fig. 11.

Material: In the Laleköy member, sample no, 1203?, 1228? and 1268

Description: In the tangential equatorial view (pl. 10, fig. 1) two subglobular, large chambers of planispirally coiled first stage and an oblique view of the first subglobular chamber belonging to uniserial second stage are observed. Wall is thick and made up of dark-coloured microgranular calcite.

Comparison: *Endotebanella kocaeliensis* (Pl. 10, fig. 1), is similar to *Endothyranella kocaeliensis* of Dağer (1978a, pl, 1112, 1978b, pl. 1, fig. 21), which is emended by Vachard et al. (1994) with respect to the dimension of coiled first stage and its more inflated chambers. The form differs from *Endotebanella pentacamerata* (Pl. 9, figs. 2, 7; pl.10, fig.4) in having more inflated chambers of

coiled first stage. Numbers of chambers in the uncoiled stage of the form are lesser than that of *Endotebanella pentacamerata*, E. sp. A, B, C (Pl. 10, fig. 2, 3 and 5-7).

Age: The form is Late Scythian to Anisian in age in the Kocaeli Peninsula (Dağer, 1978). Vachard et al. (1994) reported the uncertain existence of the form in Ladinian of Malaysia and Upper Ladinian-Lower Carnian of Sumatra. In this study the form is found in Upper Anisian.

Endotebanella sp. A

Pl. 10, fig. 2

Material: In the Gerence Formation, sample no 1120.

Description: Test consists of a planispirally coiled fist stage and a uniserial last stage. Proloculus and initial chambers of probable first whorl are not observed. In the last whorl of coiled stage, eight subspherical chambers are observed. The chambers are divided by thick septa, which are inclined in a low angle towards the chamber floor. Size of chambers gradually increases in growth direction. The uniserial stage is made up of three low chambers which are separated by thick septa. The arrangement of chambers is rectilinear. Wall is thick, simple and made up of dark-coloured microgranular calcite.

Comparison: *Endotebanella* sp. A differs from *E. pentacamerata* (Pl. 9, figs. 2, 7; pl.10, fig.4) and *E. kocaeliensis* (pl. 10, fig. 1) in having more inclined septa of coiled stage and lower chambers of uncoiled stage.

Age: In the present study, the form is found in Middle-Upper Anisian.

Endotebanella sp. B

Pl. 10, fig. 3.

Material: In the Laleköy member of the Camiboğazı Formation, sample no. 1136.

Description: Test consists of a planispirally coiled first stage and a rectilinear, uniserial last stage. Proloculus and initial chambers of coiled stage are not distinct. Numbers of whorls of the coiled stage are one and a half. Chambers of first whorl are very small in size. In the second whorl, size of chambers rapidly increases. The uniserial stage consists of five low, very slightly inflated semispherical chambers. Size of chambers rapidly increases in growth direction. Chambers are separated by thick septa and connected by large central openings. In the coiled stage, openings are basal. Wall is thick, simple and made up of dark-coloured microgranular to agglutinated calcite.

Comparison: *Endotebanella* sp. B is differs from *Endotebanella pentacamerata* (Pl. 9, fig. 2-3, 7), *E. kocaeliensis* (Pl. 10, fig. 1), *E.* sp. A (Pl. 10, fig. 2) and C (Pl. 10, fig 5-7) in having rapidly increasing chamber size of both coiled and uniserial stages.

Age: In the study the form is found in Middle-Upper Anisian.

***Endotebanella* sp. C**

Pl. 10, figs. 5-7.

Material: In the Laleköy member of the Camiboğazı Formation, sample no. 1135, 1141 and 1154.

Description: First stage of the form is not distinct in the investigated material. Only one individual (pl. 10, fig. 5) have a hardly visible tangential part of coiled first stage. Uniserial second stage is rectilinear and may include more than seven chambers. The chambers are semispherical and gradually increasing in size in the beginning, then rapidly enlarging and inflating. Wall consists of dark-coloured microgranular to agglutinated calcite. It is thick and simple.

Comparison: The *Endotebanella* sp. C differs from *E. pentacamerata*, (Pl. 9, fig. 2-3, 7), *E. kocaeliensis* (Pl. 10, fig. 1), E. sp. A (Pl. 10, fig. 2) and *E.* sp. B (Pl.10, fig.

3) in having rapidly enlarging and inflating chambers in the second half of the uniserial stage.

Age: The *Endotebanella* sp. C is found in the Middle/Upper Anisian, in this study.

***Endotebanella* spp.**

Pl. 10, fig. 8-10; pl. 11, figs. 1-9

Material: In the Gerence Formation, sample no. 1072; in the Laleköy member of the Camiboğazı Formation, sample no. 1131, 1135, 1137, 1145, 1155, 1157, 1164, 1167, 1168, 1180, 1184, 1186, 1192, 1193, 1196, 1203, 1211, 1214 and 1229, and in the Saplazdağı member 1272, 1296, 1300, 1318, 1347, 1350, 1372, 1377,1381, 1383, 1384, 1407, 1430 and 1434.

Remarks: In this study numerous samples consisting of uniserially arranged subspherical chambers attributed to genus *Endotebanella.* All investigated samples, except for an individual (Pl. 11, fig. 3), coiled first stages are not distinct. Uniserial chambers are low or inflated hemispheric. Wall is made up of dark-coloured microgranular to agglutinated carbonate. It is thick and simple. Because of inefficiency of investigated material, above mentioned forms are identified as *Endotebanella* spp.

Endotriada (VACHARD & RAZGALLAH, 1988) VACHARD, MARTINI, RETTORI & ZANINETTI, 1994

Endotriada kuepperi (OBERHAUSER, 1960)

Pl. 12, fig. 4, 6-9.

1960 *Endothyra kuepperi* Oberhauser, pl. 3, fig. 7 a-c, 22.

1969 "*Endothyra kuepperi*", Koehn-Zaninetti, Fig. 7.

1976 *Endothyra kuepperi*, Zaninetti, pl. 8, figs. 22-25

Material: In the Saplazdağı member of the Camiboğazı Formation, sample no. 1800, 1802 and 1806.

Description: Test is coiled, biumbilical. It consists of slightly inflated subglobular chambers. The coiling is clearly streptospiral in the earlier whorls, than becomes nearly planispiral. Numbers of whorls are three or three and a half. The size of chambers increases gradually in the earlier whorls, and rapidly in the last ones. The chambers are divided by septa which are inclined in growth direction. Wall is thin, homogenous and simple. It is made up of dark-coloured microgranular calcite.

Endotriada tyrrhenica VACHARD, MARTINI, RETTORI & ZANINETTI, 1994

Pl. 19, fig. 2-3.

1994 *Endotriada tyrrhenica* Vachard, Martini, Rettori & Zaninetti, Pl. 1, fig. 8-16; fig. 2-C

Material: In the Hanaylı member of the Camiboğazı Formation, sample no. 2105 and in the Saplazdağı member of the Camiboğazı Formation, sample no. 2111.

Description: Test is planispirally coiled and crescent in shape. It consists of hemispheric chambers which are increasing in size in growth direction. The chambers are divided by arc shaped septa. Last chamber is slightly inflated. Wall is thin and simple. It consists of dark-coloured microgranular calcite.

Comparison: *Endotriada tyrrhenica* (Pl. 19, figs. 2-3) shows similarities with *E. tyrrhenica* of Vachard et al. (1994) (Pl. 1, fig. 8-16; fig. 2C), in respect to crescent shape and dimensions of test. The form differs from *E. kuepperi*, in having crescent shape and small size of the test and arc-shaped septa.

Age: Vachard et al. (1994) reported that the form is observed in Lower Anisian Upper Anisian of the Southern Apennine, in Italy. In this study, the form is Ladinian-Carnian in age.

***Endotriada* spp.**

Pl. 13, fig. 1-5, 7-9.

Material: In the Laleköy member of the Camiboğazı Formation, sample no. 1146, 1151, 1152, 1153, 1154?, 1170, 1171, 1172, 1188, 1192, 1203, 1212, 1225 and

1241; and in the Saplazdağı member of the Camiboğazı Formation, sample no. 1407 and 1425.

Remarks: Many samples with thin and homogeneous wall, and consisting of planispirally coiled subspherical chambers attributed to genus *Endotebanella.* Test is biumbilical. The chambers are rapidly or gradually increasing in size. Two or three whorls can be observed. Wall is made up of dark-coloured microgranular calcite and is simple. Because of the inefficiency of investigated material, above mentioned forms are named as *Endotriada* spp.

Endotriadella VACHARD, MARTINI, RETTORI & ZANINETTI, 1994

Endotriadella wirzi (KOEHNZANINETTI, 1968*)* VACHARD, MARTINI, RETTORI & ZANINETTI, 1994

Pl. 14, fig. 2-3, 5-6, 8-9.

1945 *Ammobaculites sp.* Wirz, pl. 74, figs, 12?, 14.

1968 *Ammobaculites wirzi* Koehn-Zaninetti, nomen nudum.

1969 *Ammobaculites wirzi* n sp. Koehn-Zaninetti, figs. 5A-D, F-K.

1972 *Endothyranella wirzi* Zaninetti, Brönnimann & Boud, pl. 4, figs. 1-35; pl. 5, figs. 1-21; pl. 9, figs. 4-12, pl. 10, figs. 5-6, pl. 11, figs. 13-18, 23, 24.

1994 *Endotriadella wirzi* Vachard, Martini, Rettori & Zaninetti, pl. 1, fig. 9.

Material: In the Laleköy member of the Camiboğazı Formation, sample no. 1236 and 1256, and in the Saplazdağı member of the Camiboğazı Formation, sample no. 1809.

Description: Test is coiled. A small globular proloculus is followed by planispirally coiled first stage, consisting of inflated, subglobular chambers. The coiling may be slightly oscillating. Numbers of whorls are two. Size of the chambers is very small in the first whorl, rapidly increases in the second whorl. The coiled stage is followed by an irregularly rectilinear uniserial stage consisting of distinctly inflated subglobular chambers. Size of chambers gradually increases in the growth

direction. The chambers are connected by central openings. Wall is thin and homogeneous. It is made up of dark-coloured microgranular calcite.

Comparison: The *Endotriadella wirzi* (Pl. 14, fig. 2-3, 5-6, 8-9) differs from, *E.* aff *wirzi* (Pl. 14, figs. 7-8, 11) in having more inflated chambers in both stages and an irregularly rectilinear arrangement in the second stage. Thickness of wall of the form is less than the species of *Endotebanella* (Pl. 9, figs. 2, 7; pl.10, figs. 1-4, 5-10, pl.11, figs. 1-9).

Age: Zaninetti (1976) reported that the *Endothyranella wirzi* is Early-Anisian?, Middle Late Anisian in age. Wirz (1945) noted the form is found in Ladinian. In Vachard (1994) stratigraphic and geographic distribution of *Endotriadella wirzi* summarized as follow; in Anisian in the Carpats, Dinarids, Balkans, Turkey, Malaysia, China and in Anisian-Early Ladinian in southern Apennine. In the study the form is the Anisian-Ladinian in age.

Endotriadella* aff. *wirzi

Pl. 15. figs. 7-8, 11.

Material: In the Saplazdağı member of the Camiboğazı Formation, sample no. 1803.

Description: Test is coiled. A globular proloculus is followed by planispirally coiled first stage, consisting of subglobular chambers. Sizes of the chambers gradually increase in the growth direction. Numbers of whorls are one and a half. The coiled stage is followed by regularly rectilinear uniserial stage consisting of inflated subglobular chambers. Sizes of chambers gradually increase towards the last chamber. Wall is thin and homogeneous. It is made up of dark-coloured microgranular calcite.

Comparison: *Endotriadella* aff. *wirzi* (Pl. 15, figs. 7-8, 11) differs from *E. wirzi* (Pl. 14, fig. 2-3, 5-6, 8-9) in having less inflated chambers which gradually increase

in size in the coiled stage consisting of one and a half whorl, in contrary to *E. wirzi* having more inflated chambers rapidly increasing in size, consisting of two whorls.

Age: In the study, age of the *Endotriadella* aff. *wirzi* is Ladinian.

***Endotriadella* spp.**

Pl. 13, fig.6, pl. 15, fig 9-10, pl. 16, fig. 1-4.

Material: In the Laleköy member of the Camiboğazı Formation, sample no. 1155, 1160, 1162, 1171, 1185, 1194, 1196, 1227, 1229, 1241, 1276, 1280, 1281, 1283, 1284 and 1294, and in the Saplazdağı member of the Camiboğazı Formation, sample no. 1800?, 1803, 1806, 1808 and1809?.

Remarks: Numerous individuals with uniserially arranged hemispheric chambers are attributed to genus *Endotriadella* spp. Proloculus and coiled first stage are not distinct. The chambers are gradually to rapidly increasing in size towards the last chamber. Wall is made up of dark-coloured, homogeneous microgranular calcite and is simple.

Age: The individuals of *Endotriadella* spp. are found in Upper Anisian to Ladinian time interval.

TEXTULARIINA DELAGE & HEROUARD, 1896

Lituolacea DE BLAINVILLE, 1827

Hormosinidae HAECKEL, 1894

Reophacinae CUSHMAN, 1910

Reophax DE MONTFORT, 1808

***Reophax* sp. (A)**

Pl. 16, fig. 5-6.

Material: In the Laleköy member of the Camiboğazı Formation, sample no. 1151, 1210 and 1242.

Description: The elongate test consists of uniserially arranged, rounded chambers. The chambers are inflated only in growth direction. Each succeeding chamber attaches near the base of the apertural neck of the preceding chamber. Numbers of the chambers are four or more. Proloculus is not distinct. Wall is thick, simple and agglutinated including different type material.

Comparison: The *Reophax* sp A (Pl. 16, fig. 56), differs from *Reophax* sp. B (Pl. 16, figs. 7, 10), C (Pl. 16, figs. 8, 9) , D (Pl. 17. fig. 3) and E (Pl. 17. figs. 7-9; pl. 18, fig. 1) in having chambers inflated only in growth direction.

Age: The *Reophax* sp. A is Late Anisian in age in the study.

***Reophax* sp. (B)**

Pl. 16, figs. 7, 10.

Material: In the Laleköy member of the Camiboğazı Formation, sample no. 1156, 1158, 1168 and 1223.

Description: Test is elongate and slightly curved. It consists of uniserially arranged, clearly arcuate chambers. Sizes of chambers rapidly increase in growth direction. Proloculus is not distinct. Each succeeding chambers attaches near the base of the apertural neck of the preceding chamber. Numbers of chambers observed are five. Wall is thick, simple, and irregular in thickness, and made up of agglutinated grains of dark-coloured calcareous material and spicules of the sponges.

Comparison: The *Reophax* sp B (Pl. 16, figs. 7, 10), differs from *Reophax* sp. A (Pl. 16, fig. 5-6), C (Pl. 16, figs. 8, 9), D (Pl. 17. fig. 3) and E (Pl. 17. 7-9; pl. 18, fig. 1), in having clearly pyriform chambers.

Age: The *Reophax* sp. B is Late Anisian-Early Ladinian in age in the present study.

***Reophax* sp. (C)**

Pl. 16, figs, 8, 9; pl. 17, figs. 2, 4-6.

Material: In the Laleköy member of the Camiboğazı Formation, sample no. 1159, 1169, 1180, 1191, 1211, 1229 and 1231, and in the Saplazdağı member of the Camiboğazı Formation, sample no. 1307.

Description: Test consists of uniserially arranged spherical chambers. Numbers of chambers are probably two. Second chamber is two times bigger than the preceding chamber. Proloculus is not distinct. Communication between the chambers is provided by large central openings on the septa separating these chambers (pl. 16. fig 8; pl. 17, figs. 4-6). Wall is thick, simple; irregular in thickness and formed by agglutinated grains of dark-coloured calcareous material and spicules of sponges.

Comparison and remarks: Some openings mentioned above of *Reophax* sp. C (Pl.17, figs. 4, 6) look like proloculus; however this appearance is related to the orientation of the section and the agglutinated material found between opening and wall of the chamber which is belong to septa. Also in Pl. 17, fig. 2, an indistinct opening which is on a calcareous mass projected into the small chambers may remind a proloculus. The *Reophax* sp. C (Pl. 16, figs. 8, 9), differs from *Reophax* sp. A (Pl. 16, fig. 56), B (Pl. 16, figs. 7, 10), D (Pl. 17. fig. 3) and E (Pl. 17. 79; pl. 18, fig. 1) in having rounded shape and nearly globular chambers.

Age: The *Reophax* sp. C is Late Anisian-Ladinian in age in this study.

***Reophax* sp. (D)**

Pl. 17, fig, 3.

Material: In the Laleköy member of the Camiboğazı Formation, 1159.

Description: Test consists of uniserially arranged nearly spherical chambers. Three chambers are observed. Size of the chamber rapidly and regularly increases in

growth direction. Proloculus is not distinct. Each succeeding chamber attaches near the base of the apertural neck of the preceding chamber. Wall is thick, simple, and quite regular in thickness and formed by agglutinated grains of dark-coloured calcareous material.

Comparison and remarks: The *Reophax* sp. D (Pl. 16, figs. 8, 9), differs from *Reophax* sp. A (Pl. 16, fig. 5-6), B (Pl. 16, figs. 7, 10) and E (Pl. 17. 7-9; pl. 18, fig. 1) in having nearly spherical chambers and a wall more regular in thickness. The form is similar to *Reophax* sp. C (Pl. 17. fig. 3), in respect to nearly spherical chambers, however, each preceding chamber of *Reophax* sp. C is more embraced by the fallowing chamber than those of *Reophax* sp. D.

Age: The *Reophax* sp. D is Late Anisian in age in the study.

***Reophax* sp. (E)**

Pl. 17, figs, 7-9; pl. 18, fig. 1.

Material: In the Laleköy member of the Camiboğazı Formation, sample no. 1192, 1193, 1203 and 1246; in the Saplazdağı member of the Camiboğazı Formation, sample no. 1307, 1324, 1329, 1372, 1430 and 1455.

Description: Test consists of uniserially arranged, slightly arcuate chambers. Three chambers are observed. Size of the chamber rapidly increases in growth direction. The last chamber is inflated. Proloculus is not distinct. Each succeeding chamber attaches near the base of the apertural neck of the preceding chamber. The apertural neck forms an upward projection. It is long and tubular. Wall is thick, simple, distinctly irregular in thickness, and formed by agglutinated grains of dark-coloured calcareous material and spicules of sponges.

Comparison and remarks: The *Reophax* sp E (Pl. 17. 7-9; pl. 18, fig. 1) differs from *Reophax* sp. A (Pl. 16, fig. 5-6), B (Pl. 16, figs. 7, 10) and E (Pl. 16, figs. 8, 9) in having slightly arcuate chambers and a wall distinctly irregular in thickness. The

form is similar to *Reophax* sp. B (Pl. 16. fig. 7, 10), in respect to arcuate chambers, however the chambers of *Reophax* sp. E are less arcuate and its last chamber is more inflated than the *Reophax* sp. B.

Age: The *Reophax* sp. E is Late Anisian to Ladinian in age in the study.

***Reophax* sp.**

Pl. 18, figs.2-3.

Material: In the Laleköy member of the Camiboğazı Formation, sample no. 1134 and 1216.

Remarks: Some individuals consisting of uniserially arranged subspherical to arcuate chambers are attributed to genus *Reophax* spp. Proloculus is not distinct. The chambers are gradually increasing in size towards the last chamber. Wall is thick and irregular. It is made up of agglutinated coarse grains of dark-coloured calcite and quartz.

Age: In the study, the *Reophax* spp. is Middle to Late Anisian in age.

Lituolidae (DE BLAINVILLE, 1825) LOEBLICH & TAPPAN, 1984

Glomogallerium UROSEVIC, 1995

Glomogallerum mlavicensis UROSEVIC, 1995

Pl. 18, fig. 5.

1995 *Glomogallerium mlavicencis* Urosevic, pl. 2, fig.1-19.

Material: In the Gerence Formation, sample no. 1115.

Description: Test ovoid to globular in shape and coiled. Proloculus and early stage is not distinct. Tubular second chamber is rapidly enlarging and winding around early stage. It is rapidly bulges toward to end of tube. Wall is thin and made up of microgranular carbonate.

Comparison: This is the first time that the *Glomogallerium mlavicensis* is found in Turkey. Although its early stage is not distinct, it is similar to *G. mlavicensis* of Urosevic (1995, pl. 1, figs, 1-9), in respect to tubular second chamber which is rapidly enlarging and winding around early stage and thin calcareous wall.

Age: Urosevic (1995), reported that the form is found in Lower Triassic (Upper Spathian) to Middle Triassic (Aegean), in Serbia. In the study the form also is observed in Middle to Upper Anisian.

Glomogallerum gazdzickii UROSEVIC, 1995

Pl. 18, fig. 4.

1995 *Glomogallerium gazdzickii* Urosevic, pl. 2, fig.1-18.

Material: In the Laleköy member of the Camiboğazı Formation, sample no. 1139.

Description: Test spherical in shape and coiled. Proloculus is large and spherical. Tubular second chamber is glomospirally coiled in early stage. In the last whorl, it rapidly enlarges and planispirally coils around of the early stage. Wall is thin, calcareous microgranular.

Comparison: This is the first time that the *Glomogallerium gazdzickii* is found in Turkey. It is similar to *G. mlavicensis* of Urosevic (1995, pl. 2, figs, 1- 18), in respect to tubular second chamber which is glomospirally coiled in the early stage, planispirally coiled in last whorl and in having a thin calcareous wall.

Age: Urosevic (1995), noted that the form is found in Lower Triassic (Upper most Spathian) to Lower-Middle Triassic (Aegean, and Bithynian), in Serbia. In the study the form also is observed in Middle to Upper Anisian.

Lituolinae (DE BLAİNVİLLE, 1825)

Ammobaculites CUSHMAN, 1910 74say

***Ammobaculites*? sp.**

Pl. 18, fig. 6.

Material: In the Laleköy member of the Camiboğazı Formation, sample no. 1153.

Description: In a longitudinal oblique view, test is represented by uniserially arranged, low and subglobular chambers. Proloculus and the coiled first stage are not distinct. Wall is very thick and consists of coarse-grained agglutinated grains of dark-coloured carbonate material.

Comparison: The form (Pl. 18, fig. 6) differs from genus *Endotebanella* which is mentioned in the study, in having very thick and coarse-grained agglutinated wall.

Age: The *Ammobaculites*? sp. is found in the Upper Anisian, in the study.

Textulariidae EHRENBERG,1838

Textulariinae EHRENBERG, 1838

Textularia DEFRANCE, 1824

***"Textularia"* n. sp.**

Pl. 20, figs. 1-6, 8.

Material: In the Laleköy member of the Camiboğazı Formation, sample no. 1150, 1152, 1159, 1160 and 1170, In the Saplazdağı member of the Camiboğazı Formation, sample no. 1285 and 767.

Holotype: In the Laleköy member of the Camiboğazı Formation, sample no. 1150, Thin section no. 1150, pl. 20, fig. 1, a longitudinal view.

Type locality: The Narlıcak locality, southeast of Ildır village (Fig. 5, stratigraphic type section I).

Diagnose: Test free, biserial, first stage short trochospiral consisting of a few small chambers; very small chambers in earlier two or three rows; then four or five rows consisting of rapidly inflated and enlarged chambers. Wall thick and agglutinated carbonate.

Description: Test mainly consists of biserially arranged globular chambers. Initial stage is not distinct. It can be biserial throughout or "may have an adventitious third chamber against the first pair of chambers" as it is defined in Loeblich&Tappan (1988), in the diagnosis of the genus *Textularia*. Another possibility is existence of a short trochospiral stage consisting of small chambers. The indistinct stage is followed by a biserial stage. In two or three rows, the chambers are very small; then they rapidly inflate and enlarge. Communication between the chambers is provided by large openings. Wall and septa are thick, made up of agglutinated calcareous material.

Age: The "*Textularia*" n. sp. is found in Upper Anisian to Ladinian limestone layers.

Trochamminidae SCHWAGER, 1877

Trochammininae SCHWAGER, 1877

Trochammina PARKER & JONES, 1859

Trochammina* cf. *almtalensis KOEHNZANINETTI, 1968

Pl. 18, fig. 7.

1945 *Trochammina* sp. Wirz, pl. 74, fig. 74.

1968 *Trochammina almtalensis* Koehn-Zaninetti, (nomen nudum).

1969 *Trochammina almtalensis*, Koehn-Zaninetti, pl. 5, figs. E, F, fig. 6, AP, in text.

1976 *Trochammina almtalensis*, Zaninetti, pl. 14. figs. 1-9; pl.23, fig. 8.

Material: In the Laleköy member of the Camiboğazı Formation, sample no. 737.

Description: Test is high conical in shape. It consists of trochospirally coiled and slightly low globular shaped chambers. Apical angle is about 90^0. Numbers of the whorls are three. Size of the chambers gradually increases in coiling direction. Umbilical cavity is profound and narrow. Wall is thin and simple. It consists of dark-coloured microgranular calcite.

Comparison: *Trochammina* cf. *almtalensis* (Pl.18. fig. 7) is similar to *T. almtalensis* given by Koehn-Zaninetti (1969, pl.5, figs. EF, fig. 5. A-P in text), in respect to high conical shape, size and apical angle of test. Considering inefficiency of material, the form may be named with cf. The form differs from *T. jaunensis* (Pl. 18, figs. 810) in having an apical angle about 90^0 and high trochospiral coiling, while *Trochammina jaunensis* has that of $120\text{-}130^0$.

Age: Koehn-Zaninetti, 1968, and Zaninetti 1976 reported that the *T. almtalensis* is Late Anisian and Late Anisian to Ladinian? in age respectively. The form is Middle Late Anisian in age, in the study.

Trochammina jaunensis BRÖNNIMANN & PAGE, 1966

Pl. 18, figs. 8-10.

1945 *Trochammina jaunensis* Brönnimann & Page, pl.1, figs. 6-8.

1976 *Trochammina jaunensis*, Zaninetti, pl. 23. figs. 4-5.

Material: In the Saplazdağı member of the Camiboğazı Formation, sample no. 1619 and 1809.

Description: Test is low conical in shape. It consists of trochospirally coiled strongly low globular chambers. Apical angle is 130^0 to 135^0. Numbers of the whorls are two and a half. Size of the chambers gradually increases in coiling direction. Umbilical cavity is less profound and large. Wall is thin and simple. It consists of dark-coloured microgranular calcite.

Comparison: *Trochammina jaunensis* (Pl.18. fig. 8-10) is similar to *T. jaunensis* given by Zaninetti (1976, pl.23, 4-5), in respect to low conical shape, size and apical angle of test. The form differs from *T. almtalensis* (Pl. 18, figs. 7), in having an apical angle about 130^0-135^0 and low trochospiral coiling, while *Trochammina jaunensis* has that of 90^0.

Age: Premoli Silva (1971) and Pantic (1972) reported that *T. jaunensis* is found in Anisian of the Alps and Dinarids. Zaninetti (1972) suggested a Middle to Late Triassic age. Zaninetti (1976) indicated existence of the form in Upper Triassic of Europe and Middle and Upper Triassic of Iran. In the study, the form is observed in Ladinian.

***Trochammina* spp.**

Pl. 19, figs. 1, 4-10.

Material: In the Gerence Formation, sample no. 1115, 1118 and, 1123; in the Saplazdağı member of the Camiboğazı Formation, sample no. 1622, 1809 and 2103; in the Hanaylı member of the Camiboğazı Formation, sample no. 2111, 2110 and 2109.

Description: Test is low to high conical in shape. It consists of trochospirally coiled globular or low globular chambers. Apical angle varies from 70^0 to 110^0. Apex is rounded or pointed. Numbers of whorls are 2 and 4.5. Size of the chambers gradually increases in coiling direction. Numbers of chambers in the last whorl are 4 to 5. Umbilical cavity is narrow. Wall is thin and simple. It consists of dark-coloured microgranular calcite.

Comparison: *Trochammina* spp. (Pl.19. fig. 1, 4-10) differs from *T.* cf. *almtalensis* (Pl.18. fig.7) and *T. jaunensis* (Pl.18, fig 8-10), in having different test shape and different values of the apical angles.

Age: In the study, the individuals belonging to *Trochammina* spp. are observed in Middle-Late Anisian to Carnian time interval.

Ammodiscacea REUS, 1862

Ammodiscidae REUS, 1862

Glomospirellinae CIARAPICA & ZANINETTI, 1985

Gandinella ZANINETTI & CIARAPICA, 1985

Gandinella falsofriedli (SALAJ, BORZA & SAMUEL, 1983)

Pl. 21, figs. 1-9.

1970 *Glomospirella friedli* KristanTollmann, Brönnimann, Poisson & Zaninetti, pl. 1, fig 48, 9?.

1977 *Glomospirella regularis*, He Yan & Hu LanYing, pl. 7, fig. 1, 2.

1977 *Glomospirella friedli*, He Yan & Hu LanYing, pl. 7, fig. 10, 11.

1977 *Glomospira* sp. He Yan & Hu LanYing, pl. 7, fig. 1-4.

1982 *Glomospira regularis*, Hi Yan, pl. 1, fig. 7, 8.

1982 *Glomospira friedli*, Hi Yan, pl. 1, fig. 9, 10.

1983 *Glomospirella friedli*, Gazdzicki, pl. 32, fig. 8.

1983 *Plamminella falsofriedli*, Salaj, Borza & Samuel, pl. 15, figs. 7-12.

1984 *Glomospirella* ex. gr. *friedli*, Al Shabani,Carter&Zaninetti, pl.1, fig.18,19.

1985 *Gandinella apenninica* Ciarapica & Zaninetti pl. 1, figs. 1-14.

1985 *Gandinella falsofriedli*, (Salaj, Borza & Samuel) Poisson, Ciarapica, Crilli & Zaninetti, pl. 1. figs. 1-7.

1985 *Gandinella apenninica*?, Dumont & Zaninetti, pl. 1, fig. 4.

1985 *Glomospirella* sp. 2, Dumont&Zaninetti, pl. 1, figs.8?, 9?, 10, 11, 12-13?.

1987 *Gandinella apenninica*, Ciarapica, Cirilli, Passeri, Trincianti & Zaninetti, pl. 10, figs. 1-14.

1987 *Gandinella* sp. Ciarapica, Cirilli, Passeri, Trincianti&Zaninetti, pl.1, fig.1.

1988 *Gandinella apenninica*, Peybernes, Martini, Taugourdeau-Lantz & Zaninetti, pl.6, fig. 1-65.

1990 *Gandinella apenninica*, Lakew, pl. 40, fig. 5, 7, 8.

Material: In the Hanaylı member of the Camiboğazı Formation, sample no. 1438, 1445, 1461, 1463, 1469, 1486, 1499, 1503, 1505, 1716, 1725, 1728, 1827, 1830, 1831, 1832, 1833, 1837, 1838 and 1849.

Description: The test is peloidal in shape. It consist of a globular proloculus and undivided, tubular deuteroloculus. The tubular deutoroloculus coils into three stages. The first stage is streptospiral. The streptospiral stage is followed by a sigmoidal stage consisting of a few whorls. Last stage is planispiral of one or more whorls. Diameter of the tube slightly increases in growth direction. Wall is thin, simple. It is made up of dark-coloured microgranular calcite.

Comparison: The *Gandinella falsofriedli* (Pl. 21, figs. 1-9) differs from *Gandinella* sp. aff. *falsofriedli* (Pl. 22, figs. 1-6) and *Gandinella* sp. (Pl. 22, figs. 5-6, 8-9) in having a distinct sigmoidal stage between the early streptospiral and the late planispiral stages.

Age: Ciarapica & Zaninetti (1985) noted that the *Gandinella apenninica* is Carnian? to Norian-Rhaetian in age. Peybernes et al. (1990) also emphasized a Carnian? to Norian-Rhaetian age for the *Gandinella falsofriedli*. Zamparelli et al. (1995) indicated a stratigraphic distribution for the form from Norian to Rhaetian, in the Taurus, Carpatho-Balkanic domain, Northern and Southern Apennines (Italy), Corsica, Pyrenees and Tunisia. In the study, *Gandinella falsofriedli* is found in the Carnian-Norian interval.

Gandinella* sp. aff. *falsofriedli (SALAJ, BORZA & SAMUEL, 1983)
Pl. 22, figs. 1-6.

Material: In the Saplaz member of the Camiboğazı Formation, sample no. 1406, in the Hanaylı member of the Camiboğazı Formation, sample no. 1438, 1473, 1476, 1485, 1491 and 1498.

Description: The test is peloidal in shape. Proloculus is not distinct. Undivided, slightly enlarging and tubular deuteroloculus coils streptospirally in early stage. The streptospiral stage is followed by an irregularly oscillating, nearly planispiral stage consisting of two or three whorls. Last stage is planispiral consisting of one whorl. Wall is thin, simple. It is made up of dark-coloured microgranular calcite.

Comparison: The *Gandinella* sp. aff. *falsofriedly* (Pl. 22, figs. 1-6) differs from *Gandinella falsofriedli* (Pl. 21, figs. 1-9) and *Gandinella* sp. (Pl. 22, figs. 5-6, 8-9) in having a irregularly oscillating, nearly planispiral stage between early streptospiral and late planispiral stages.

Age: The form is Carnian-Norian in age, in the study.

***Gandinella* sp.**

Pl. 22, figs. 5-6, 8-9.

Material: In the Hanaylı member of the Camiboğazı Formation, sample no. 1717, 1725, 1729, 1730?, 1831, 1848 and 1853.

Description: The test is peloidal in shape. Proloculus is not distinct. Undivided, slightly enlarging, tubular deuteroloculus coils streptospirally in early stage. The streptospiral stage is followed by a nearly sigmoidal stage consisting of two whorls. It may have a planispiral whorl in the last stage. Wall is thin, simple. It is made up of dark-coloured microgranular calcite.

Age: The *Gandinella* sp. is found in Norian limestones, in the study.

Glomospira RHEZAK, 1885

Glomospira densa (PANTIC, 1964)

Pl. 24, figs. 1-4.

1964 *Plammina densa*, n. gen. n. sp. Pantic, pl. 1, figs. 1, 2; pl. 2, figs. 1-9.

1969 *Glomospira densa*. Koehn-Zaninetti, pl. 4, figs. A-C.

1971 *Plammina densa* Premoli-Silva, pl.21, figs. 13; pl. 22, figs, 3, 4.

1976 *Glomospira densa*, Zaninetti, pl. 2, figs. 17, 21.

1993 *Glomospira densa*, Altıner & Koçyiğit, pl. 3,fig. 3, pl. 4, figs. 1-12.

1994 *Plammina densa*, Zaninetti, Rettori & Martini, pl. 2, fig. 15, 16.

1995 *Plammina densa*, Rettori, pl. 2, figs. 6-12.

Material: In Gerence Formation, sample no. 1115 and in the Laleköy member of the Camiboğazı Formation, sample no. 1134 and 767.

Description: The test is spherical and streptospirally coiled. Proloculus is not distinct. Second chamber is long, tubular and undivided. The tubular chamber winds around the initial one forming a coil. The initial whorls are tightly coiled around the proloculus; the following whorls are rarely arranged. Whorls are numerous. Diameter of second chamber increases gradually towards the open end of the tube. Aperture is at the end of the second chamber and simple. Wall is finely agglutinated or microgranular consisting of dark-coloured calcite.

Comparisons and remarks: *Glomospira densa* (Pl. 24, figs. 1-4) differs from *G. praedensa* (Pl. 24, figs. 5-6) in having a more developed streptospiral coiling. In the studies published so far, as listed above in the synonym list, similar glomospiral forms were named as *Glomospira* or *Plammina* by many authors. In the first studies of Pantic (1964) and Premoli-Silva (1971, pl. 21. figs. 1-3; pl. 22. figs. 3-4) the genus *Plammina* was determined depending on density in the streptospiral coiling. Similar Glomospiral forms was attributed to genus *Glomospira* (Rezak, 1885) by Zaninetti (1976, pl. 2, figs. 17, 21). In the study (pl. 24, fig. 1-4) and İşintek et al. (2000) (Pl. 1, fig. 1) mentioned forms are considered as genus *Glomospira*. According to the study, density on the coiling is not sufficient to differentiate the genus. However, it can be emphasized that coiling of the individuals of the Pantic (1964) and Premoli-Silva (1971) are denser than specimen of the Zaninetti (1976, pl. 2, fig. 21). Similarly, sample of the İşintek et al. (2000) displays denser coiling than the samples presented

in this study and by Zaninetti (1976, pl. 2, fig 21). Consequently, the two different types Glomospiroid form are comparable and may be differentiated.

Age: The form is Middle to Late Anisian in age in the study.

***Glomospira praedensa* UROSEVIC, 1988**

Pl. 24, figs. 5-6

1988 *Plammina praedensa* n. sp. Urosevic, pl. 1, fig. 1-6.

1988 *Glomospira regularis*, He, pl. 1, fig 1-10.

1994 *Plammina praedensa*, Rettori, Angiolini & Muttoni, pl. 1, figs. 3,4.

1995 *Plammina praedensa*, Rettori, pl. 3, figs. 13, ?4, 5.

Material: Gerence Formation, Nohutalan Mahalle partial type section, sample no. 737, thin section no. 737, bioclastic wackestone.

Description: Test is free and globular in shape. It consists of a round proloculus and an inseptate, "clue-coiled", tubular second chamber. Initial two or three whorls are densely coiled. Then the axis of coiling slightly varies and more gently elongates in the following two or three whorls. Terminal whorl is much wider than the preceding ones. Wall is thin, simple and it is made up of agglutinated to microgranular calcareous material. (Urosevic' test diameter is 430 micron, proloculus is 32 micron).

Comparison: *Glomospira praedensa* (Pl. 24, figs. 5-6) is similar to the samples of Urosevic (1988, pl. 1, fig. 1-6.) and Rettori (1995, pl. 3, figs. 13, 5) in point of dimension of the test and the type of coiling.

Age: In Rettori (1994) stratigraphic and geographic distribution of *Glomospira praedensa* was suggested as Scythian in western Serbia, Hydra Island of Greece, Himalaya and China. The form is found together with Middle Scythian to Middle Anisian aged *Meandrospira pusilla* and Early to Middle Anisian aged *M. dinarica.*

However, the age of the *G. praedensa* must be extended from Early Scythian to Middle Anisian in Karaburun Peninsula.

***Glomospira* sp.**

Pl. 24, figs. 8-9

Material: In the Hanaylı member of the Camiboğazı Formation, sample no. 1830, 1831, 1835 and 1841.

Description: Test is globular in shape. Proloculus and early whorls are not distinct. Tubular undivided deuteroloculus is streptospirally coiled. Diameter of the tubular chamber distinctly increases in growth direction. Wall is thin, simple and it is made up of dark-coloured microgranular calcareous material.

Comparison: Numbers of whorls and coiling density of the *Glomospira* sp. (Pl. 24. figs. 8-9) is lesser than those of *Glomospira densa* (Pl. 24, fig 1-4).

Age: *Glomospira* sp. is the Norian in age in the study area.

Glomospirella PLUMMER, 1945

Glomospirella grandis (SALAJ, in SALAJ, BİELY & BISTRICKY, 1967)

Pl. 25, figs. 1-2

1966 *Pilammina semiplana*, n. sp., Kochansky-Devide &Pantic, pl. 1, fig. 5, 6.
1967 *Pilammina grandis* n. sp. Salaj. In Salaj, Biely &Bistricky, pl. 3, fig. 4.
1967 *Plammina semiplana*, Salaj, Biely & Bistricky, pl. III, fig. 3.
1969 *Glomospirella grandis* Koehn-Zaninetti, pl. 4, fig. D.
1971 *Glomospirella grandis*, Baud, Zaninetti & Brönnimann, pl. 1, figs. 6-9.
1971 *Glomospirella grandis*, PremoliSilva, pl. 22, figs. 1, 2, 5, 7.
1971 *Glomospirella semiplana*, PremoliSilva, pl. 22, fig. 6.
1976 *Glomospirella grandis*, Zaninetti, pl. 2, fig. 2-6.
1976 *Glomospirella semiplana*, Zaninetti, pl. 3, fig. 1.

1978 a *Glomospirella grandis*, Dağer, pl. 1, fig. 3.

?1983 *Pilamminella grandis*, Salaj, Biely & Bistricky, pl. 12, fig. 3, 4.

1992 *Pilamminella semiplana*, Trifonova, pl. 1, fig. 10.

1993 *Glomospirella grandis*, Altıner & Koçyiğit, pl. 4, fig. 13.

1994 *Glomospirella grandis*, Rettori, Angiolini & Muttoni, pl. 1, figs. 9, 10.

Material: In the Gerence Formation, sample no. 1115 and 1123.

Description: Proloculus and initial parts are not distinct. Test is formed by a tubular, undivided deuteroloculus. It is glomospirally coiled in first stage. In the second stage, it becomes oscillated and it is planispirally coiled in last stage. Wall is thin, simple and it is made up of microgranular calcite.

Age: Stratigraphic distribution of the *Glomospirella grandis* is given as Anisian and Middle to Late Triassic by Zaninetti (1976) and Rettori (1995) respectively. The form is Early to Middle Anisian in age in the Karaburun Peninsula.

***Glomospirella* n. sp.**

Pl. 25, fig. 3

Material: In the Hanaylı member of the Camiboğazı Formation, sample no. 1507.

Holotype: In the Hanaylı member of the Camiboğazı Formation, sample no. 1507, thin section no. 1507.

Type Locality: In the southeast of the Ildır Village, in the Narlıcak stratigraphic section (fig. 5, I).

Diagnosis: Test biumbilical, elongated, consisting of globular proloculus and undivided tubular deuteroloculus. The first stage large glomospiroid. The second stage oscillating in different plans and the last stage slightly oscillating planispiral consisting of three or four whorls, perpendicular to preceding stage. Wall microgranular and calcareous.

Description: Test is biumbilical, elongated in axial view. Globular proloculus is followed by tubular undivided deuteroloculus. The deuteroloculus streptospirally coils in the first stage. Following oscillating two whorls are approximately perpendicular to the preceding stage. Last stage is slightly oscillated planispiral. It consists of three or four whorls. Diameter of the deuteroloculus gradually increases in growth direction. Wall is thin, simple. It is made up of dark-coloured, calcareous microgranular material.

Age: In the study, *Glomospirella* n. sp. is Norian in age.

Glomospirella rosetta

Pl. 22, fig. 7-10.

1987 *Glomospirella rosetta* Ciarapica, Cirilli & Zaninetti (in Ciarapica et al. 1987), pl. 11, fig. 1; pl. 12, figs. 1-9.

Material: In the Hanaylı member of the Camiboğazı Formation, sample no. 1853.

Description: Test consists of a small globular proloculus and a long, coiled and tubular deuteroloculus. The tubular chamber coils streptospirally in early stage. Later coiling becomes planispiral consisting of four whorls. First two whorls of the planispiral stage is slightly oscillating. The diameter of the tube is very small in early stage. It slightly increases in growth direction. Wall is thin, simple, and it consists of dark-coloured microgranular calcite.

Comparison and remarks: The *Glomospirella rosetta* (Pl. 22, fig. 710) differs from *G.* sp. aff. *rosetta* in having four planispirally coiled whorl in the last stage. *G.* sp. aff. *rosetta* has two slightly oscillating, nearly planispiral whorls. Ciarapica et al. (1987), reported a streptospiral stage, a rarely observed sigmoidal stage and a planispiral stage consisting of two whorls in *Glomospirella rosetta*. In the individual of the study it must be emphasized that, second stage is slightly oscillating and nearly planispiral, instead of being sigmoidal.

Age: Ciarapica et al. stated that the type layer of *Glomospirella rosetta* is in the Rhaetian, and its stratigraphic distribution is in Norian?-Rhaetian. The form is fond in Norian in the study.

Glomospirella* sp. aff. *rosetta

Pl. 23, figs. 1-4, 7

Material: In the Hanaylı member of the Camiboğazı Formation, sample no. 1437, 1463, 1459, 1469, 1472, 1473?, 1473, 1480, 1490, 1491 and 1499.

Description: Test consists of a small globular proloculus and a long, coiled tubular deuteroloculus. The tubular chamber coils streptospirally in early stage. Then, coiling becomes planispiral. Slightly oscillating, nearly planispiral one or two whorls can be observed. The diameter of the tube is very small in the early stage. It slightly increases in growth direction. Wall is thin, simple, and consists of dark-coloured microgranular calcite.

Remarks: As mentioned above, *G.* sp. aff. *rosetta* is similar to *G. rosetta* (Pl. 22, fig. 7-10) in respect to early streptospiral stage and slightly oscillating, nearly planispiral stage. However the form lacks the last distinctly planispiral two whorls which are clearly observed in *G. rosetta* (Pl. 22, figs, 7, 9).

Age: The *Glomospirella* sp. aff. rosetta is Norian in age, in the study.

***Glomospirella* spp.**

Pl. 25, figs. 5, 7-8

Material: In the Hanaylı member of the Camiboğazı formation, sample no. 1717, 1722, 1725, 1730, 1732, 1749, 1824, 1827, 1832, 1846?, 1853, 1860 and 2104?.

Description: Tests are spherical in shape. Proloculus is not distinct, in each form. Long, tubular deuteroloculus coils streptospirally in the early stage, in each form.

Then, different type coiling, consisting of one, two or more sigmoidal or oscillating planispiral whorls follow the streptospiral stage. Wall is thin and simple. It is made up of dark-coloured microgranular calcite, in each form..

Age: In the study, *Glomospirella* spp. is Norian in age, in the study.

Glomospirella* gr. *expansa KRISTAN-TOLLMANN, 1964

Pl. 26, figs. 4-8, 10

1964a *Glomospirella expansa* Kristan Tollmann, Abb. 2, figs. 6-7.

1975a *Involutina expansa* Hohenegger & Piller (non illustreted).

1987 *Glomospirella expansa*, Ciarapica, Crilli, passeri, Trincianti & Zaninetti, pl. 5, fig. 10.

1995 *Glomospirella* aff. *G. expansa*, Zamparelli, Iannace & Rettory, pl. 1, fig. 21-25.

Material: In the Hanaylı member of the Camiboğazı Formation, sample no. 1832, 1834, 1839, 1841, 1842, 1845, 1850 and 1845.

Description: Strongly recrystallized test is biumbilical and elongated discoidal in shape in axial view. Proloculus and details of the first stage are not distinct. However the first stage reflects a view of reduced Glomospiroid stage which forms a small peloid in the centre of the test. The first stage is followed by a planispiral stage, which is sometimes oscillating in last whorl. Microgranular calcareous wall is thin and simple. It is generally represented by light-coloured calcite as a result of strong recrystallization.

Comparison: The *Glomospirella* gr. *expansa* (Pl. 26, figs. 4-8, 10) differs from *Glomospirella* n. sp. (Pl. 25, fig. 3) in having smaller glomospiroid stage. It also has smaller glomospiroid stage and lesser oscillating planispiral stage than the *Glomospirella* sp. A (Pl. 25, figs 4, 6, 9) and *Glomospirella* spp. (Pl. 25, figs. 5, 7-8; pl. 26, figs. 1-3). The form may be confused with *Aulotortus tenuis* (Pl. 41, figs. 4, 7-

10). *Glomospirella expansa* was also considered synonyms of *A. tenuis* (Kristan, 1957) according to Piller (1978). In this study, evolute planispiral stage and lacking of umbilical mass of *G.* gr. *expansa*, in contrary to involute planispiral stage and existence of umbilical mass allows differentiating these two genera and species.

Age: Zaninetti (1976) and Zamparelli et al. (1969, 1967), Salaj et al. (1983) reported that *G. expansa* is found in Norian-Rhaetian of the West Carpathians. The form is also the Norian-Rhaetian in age, in the Karaburun Peninsula.

***Glomospirella* sp. (A)**

Pl. 25, figs. 4, 6, 9

Material: In the Lower Limestone subunit of the Nohutalan Formation Sample no. 584 and in the Hanaylı member of the Camiboğazı Formation, sample no. 1832 and 1850.

Description: Test is biumbilical, elongated discoid in shape, in axial view. Proloculus is not distinct. Undivided tubular second chamber streptospirally coils in the first stage. The first stage is followed by regularly oscillating second stage. Transversal view of the tubular second chamber is crescent in shape. Its diameter rapidly increases in growth direction. Microgranular calcareous wall is relatively thick and simple. It may be represented by light-coloured calcite, as a result of strong recrystallization.

Comparison: The *Glomospirella* sp. A (Pl. 25, figs. 4, 6, 9) differs from *Glomospirella* n. sp. and *Glomospirella* gr. *expansa* (Pl. 26, figs. 4-8, 10) and *Glomospirella* spp. (Pl. 25, figs. 5, 7-8; pl. 26, figs. 1-3) in having very regularly oscillating second stage.

Age: The *Glomospirella* sp. A is Norian-Rhaetian in age in the Karaburun Peninsula.

Paulbrönnimanninae RETTORI & ZANINETTI, 1993

Paulbrönnimannia RETTORI & ZANINETTI, 1993

Paulbrönnimannia judicariensis (PREMOLI SILVA, 1971) RETTORI & ZANINETTI, 1993

Pl. 26, fig. 9.

1971 *Agathammina judicariensis* Premoli-Silva, pl. 29, figs.13, 5-6.

1979 *Paleomiliolina judicariensis* Trifonova, pl. 1, figs. 1-6.

1994 *Paulbrönnimannia judicariensis* Zaninetti, Rettori & Martini, pl. 1, figs. 1.18.

Material: In the Laleköy member of the Camiboğazı Formation, sample no. 737.

Description: Test is ellipsoidal, elongated in shape. Early stages are not distinct as a result of strong recrystallization. Only oscillating planispiral last stage is observed. It is represented with two whorls of undivided tubular deuteroloculus. Calcareous wall is thin, simple and microgranular.

Remarks: Existence of *Paulbrönnimannia? judicariensis* was fist recorded by İşintek et al. (2000, pl. 2, fig. 11) in the Karaburun Peninsula and Anatolia. Although the fossil material is inefficient, lots of similar individuals presented with the form in pl. 26, fig. 9 are morphologically very similar to *Paulbrönnimannia judicariensis,* and are defined here as *Paulbrönnimannia judicariensis*.

Age: The *Paulbrönnimannia judicariensis* was reported by Premoli-Silva (1971), Rettori & Zaninetti (1993) and Zaninetti et al. (1994) in Anisian (Pelsonian) of the Alps, Carpats and Balkans. The form is found in the Middle, Late Anisian limestone of the Karaburun Peninsula.

Paulbrönnimannella RETTORI, in ZANINETTI, MARTINI & RETTORI, 1994

Paulbrönnimannella* cf. *whittakeri RETTORI, in ZANINETTI, MARTINI & RETTORI, 1994

Pl. 27, fig. 1.

1994 *Paulbronnimannia whittakeri* Rettori, in Zaninetti, Martini & Rettori, pl. 2, figs. 1-9.

Material: In the Laleköy member of the Camiboğazı Formation, sample no. 1223.

Remarks: Test consists of two stages. Proloculus is not distinct. The first stage is a peloid in the central part of the test. Its properties are not clear as a result of strong recrystallization. However, this central peloid is considered here as the involute first stage of the *Paulbrönnimannella whittakeri* of Rettori (1994), which is formed by tubular undivided deuteroloculus. In the second stage the coiling becomes planispiral evolute. Numbers of planispiral whorls are five. Wall is thin, simple and is made up of dark-coloured microgranular calcareous material.

Comparison: *Paulbrönnimannella* cf. *whittakeri* is similar to *P. whittakeri* presented by Rettori (1994, Pl. 2, figs. 19) in respect to early involute stage consisting of a peloid in the central part of the test, and last planispiral stage.

Age: Rettori (1994) reported that *Paulbrönnimannella whittakeri* is Anisian (Late Pelsonian) in age. In the study the form is also Late Anisian in age.

Ataxophragmiacea SCHWAGER, 1877

Ataxophragmiidae SCHWAGER,1877

Ataxophragmiid Foram.

Pl. 27, fig. 4.

Material: In the Hanaylı member of the Camiboğazı Formation, sample no. 1465

Remarks: Numerous forms with three or biserially arranged chambers are found in the study. The test is agglutinated or microgranular calcareous.

Pernerininae LOEBLICH &TAPPAN, 1984

Palaeolituonella BERCZIMAKK, 1981

Palaeolituonella meridionalis (LUPERTO, 1965), ZANINETTI, CIARAPICA & MARTINI, 1981

Pl. 27, figs. 2-3, 5-8.

1965 *Textularia meridionalis* n. sp. Luperto, pl. 10, figs. 6, 7.

1981 *Palaeolituonella majzoni* nov. gen., nov. sp. Bérczi-Makk, p. 391, pl.1, fig. 1B.

1981 Foraminifer genus indet. 2, Altıner & Zaninetti, pl. 88, fig. 2.

pars1984 *Palaeolituonella majzoni*, Senowbari-Daryan, p.84, pl. 1, fig. 8, no figs. 3-4; no pl. 2, fig. 7.

1986 *Palaeolituonella meridionalis*, Zaninetti, Ciarapica&Martini, pl.1,fig. 1-4.

1987 *Palaeolituonella majzoni*, Oravecz-Scheffer, pl. 86, fig. 5.

1990 *Palaeolituonella meridionalis*, Ciarapica, Crilli, Martini, Rettori, Zaninetti & Salvini-Bonnard, pl. 4, fig. A.

1992 *Palaeolituonella meridionalis*, Trifonova, pl. 4, figs. 21, 22.

1995 *Palaeolituonella meridionalis*, Rettori, p. 65, pl. 5, figs.1012; pl.6, figs. 6.

? 2000 *Palaeolituonella meridionalis*, İşintek, Altıner & Koca, pl. 3, fig. 7.

Material: In the Laleköy member of the Camiboğazı Formation, sample no. 1203 and 1217; in the Saplazdağı member of the Camiboğazı Formation, sample no. 1317, 1360, 1411, 1418 and 1420; and in the Hanaylı member of the Camiboğazı Formation, sample no. 1489.

Description: Test is conical in shape and has two stages. The first stage is trochospirally coiled and multichambered. Size of the chambers slightly increases in growth direction. The second stage is not coiled. It is straight and biserial in the first row and uniserial in the last three or four rows (Pl. 27, figs, 2-3, pl. 28, fig. 4). The

chambers are slightly convex towards the exterior and are very low in height. Size of the chambers rapidly increases towards the final chamber of the test. Wall and septa are made up of dark-coloured, microgranular to agglutinated calcareous material containing larger light calcite crystals and grains of unknown origin.

Comparison: *Palaeolituonella meridionalis* (Pl. 27, figs. 2-3, 5-8) differs from *Paleolituonella primitiva* n. sp. (Pl. 28, figs. 2-3, 5-6, 8-9; pl. 29, figs.1-9) in having thicker wall, chambers of slightly rounded shape and reduced row numbers of uniserial stage.

Age: To Zaninetti et al. (1986), *Palaeolituonella meridionalis* is Middle to Late Triassic in age. Rettori (1994) summarized the stratigraphic distribution of the form is as late Pelsonian (Middle Anisian) to Middle Carnian and probably Late Carnian to Middle Norian. In the study the form is observed in Late Anisian-Norian time interval.

***Palaeolituonella primitiva* n. sp.**

Pl. 28, figs. 2-3, 5-6, 8-9; pl. 29, figs.1-9.

Material: In the Laleköy member of the Camiboğazı Formation, sample no. 1153, 1173, 1175, 1183, 1193, 1194, 1195, 1200, 1203, 1211, 1215, 1226 and 1232; and in the Saplazdağı member of the Camiboğazı formation, sample no. 1261, 1283, 1295, 1332, 1347 and 1350.

Holotype: Sample no. 1200, thin section no. 1200, pl. 28, fig. 3; paratypes pl. 29, figs. 7-8.

Type location: Southeast of the Ildır village, in the stratigraphic type section of Narlıcak location (fig. 5, section I).

Origin of the name: The name is originated from the primitive structure of the form.

Diagnosis: Test elongated conical in shape and has two stages. The first stage trochospirally coiled and multichambered. Chambers slightly increase in size in growth direction. The second stage is uncoiled, straight or slightly curved, biserially arranged in the first row and then uniserial. The chambers distinctly angled in uniserial part. Wall and septa, microgranular to agglutinated calcareous and thin.

Description: Test is elongated conical in shape and of two stages. The first stage is trochospirally coiled and multichambered. Size of the chambers slightly increases in growth direction. The second stage is not coiled, straight or slightly curved, biserial in the first row and uniserial in the last five rows (Pl. 28, fig. 3, pl. 29, figs. 68). The chambers are distinctly angled in the last few rows, and very low in height. Size of the chambers rapidly increases towards the final chamber of the test. Wall and septa are distinctly thin and made up of dark-coloured, microgranular to agglutinated calcareous material.

Comparison: *Palaeolituonella primitiva* n. sp. (Pl. 28, figs. 2-3, 5-6, 8-9; pl. 29, figs.1-9) differs from *Paleolituonella meridionalis* (Pl. 27, figs. 2-3, 5-8) in having less agglutinated and distinctly thin wall, angled chambers in the last few rows and increased numbers of rows in the uniserial stage.

Age: *Palaeolituonella primitiva* is Late Anisian-Ladinian in age.

INVOLUTININA HOHENEGGER & PILLER, 1977

Involutinacea BÜTSCHLI, 1880

Triadodiscidae ZANINETTI, 1984

Lamelliconinae ZANINETTI, CIARAPICA, DECROUEZ & MARTINI, 1987

Lamelliconus PILLER, 1978

Lamelliconus ventroplanus (OBERHAUSER, 1957) PILLER, 1978

Pl. 30. figs. 1-2, 5.

1957 *Trocholina* (*Trocholina*)*ventroplana* Oberhauser, pl. 20, figs. 15-23, fig. 1 (2) in texte.

1957 *Trocholina* (*Trocholina*) *biconvexa* sp. Nov., Oberhauserpl. 21fig. 26-27; fig. (3-5) in text.

1957 *Trocholina* (*Trocholina*) *biconvexa biconvexa* sp. nov. ssp. nov., Oberhauser, pl. 21, figs. 28-33; fig. 1 (3) in text.

1957 *Trocholina* (*Trocholina*) *biconvexa minor,* sp. nov. ssp. nov. Oberhauser, pl. 21, fig. 34-37; fig. 1 (4-5) in text.

1960 *Trocholina ventroplana* Oberhauser, pl. 5, fig. 9.

1978 *Lamelliconus biconvexus* Piller, pl. 16, fig. 1-2.

?1983 *Lamelliconus ventroplanus*, Salaj, Borza & Samuel, pl. 146, fig. 3 (5).

1984 Trocholina cordevolica, He, pl. 4, fig. 16, 19-21.

1989 *Lamelliconus* ex. gr. *biconvexus-ventroplanus* Salvini-Bonnard & zaninetti, pl. 2, fig. 1-7.

1990 *Auloconus biconvexa minor* He & Wang, pl. 11, fig. 7.

1990 *Auloconus alticonus* n. sp. He & Wang, pl. 11, figs. 1-6, 8-9.

1990 *Trocholina crassa* Kristan, He & Wang, pl. 11, figs. 13-14.

1990 *Trocholina simplex* He, pl. 11, figs. 10-11.

1991 *Lamelliconus cordevolica*, He & Cai, pl. 3, figs. 7-11, 14.

1993 *Lamelliconus ventroplanus*, Trifonova, pl. 3, figs. 3, 5-7.

Material: In the Laleköy member of the Camiboğazı Formation, sample no. 1206 and in the Hanaylı member of the Camiboğazı Formation, sample no. 1469 and 1835.

Description: Test is hemispheric to conic in shape. The height and base of the cone are approximately equal and the ventral side of the test is plain. Proloculus is not distinct. Trochospirally coiled, tubular, undivided second chamber forms whole of the test. As a result of strong recrystallization, lateral and umbilical lamellae are not distinct. Umbilical area is filled by coarse grain spar calcite. Wall of the tube is also represented with light-coloured calcite.

Comparison: *Lamelliconus ventroplanus* (Pl. 30, figs. 3-4, 6-8) differs from *L. multispirus* (Pl. 30, figs. 3-4, 6-8), *L. biconvexsus* (Pl. 32, figs. 1-2, 4), *L.* cf. *biconvexsus* (Pl. 32, fig. 3) and *L. procerus* (Pl. 31, figs. 1-10) in having plane

ventral side. Besides, numbers of whorls of the tubular chamber of the form is lesser than those of *L. multispirus* and *L. procerus*.

Age: To Zaninetti 1976, *L. ventroplanus* is Carnian in age. Rettori (1994) summarized stratigraphic distribution of the form as Ladinian-Carnian and he emphasized the probable existence of the form in latest Anisian and Earlier Norian. In the study *L. ventroplanus* is found in the Ladinian-Norian interval.

Lamelliconus multispirus (OBERHAUSER, 1957) SALAJ, BORZA & SAMUEL, 1983

Pl. 30. figs. 3-4, 6-8.

1957 *Trocholina* (*Trocholina*) *multispira* Oberhauser, pl. 20, figs. 1-14; fig. 1 (1) in text.

1963 *Trocholina multispira* Kristan-Tollmann, fig. 8 (8).

1978 *Trocholina cordevolica* Oberhauser, pl. 2, fig. 5.

1983 *Lamelliconus multispirus* Salaj, Borza & Samuel, pl. 124, figs. 3-6 ; pl. 125, figs. 1, 6-7 ; pl. 146, fig. 2 (4).

1993 *Lamelliconus multispirus*, Frechengues, Peybernes, Martini & Zaninetti, pl. 1, figs. 14-16, 17B, 18-19.

Material: In the Laleköy member of the Camiboğazı Formation, sample no. 1182, 1203 and 1212 and in the Hanaylı member of the Camiboğazı Formation, sample no. 1437 and 1837.

Description: Test is conical in shape. It has a distinctly great height/base ratio. Proloculus is not distinct. Trochospirally coiled, tubular, undivided second chamber forms whole of the test. As a result of strong recrystallization, lateral lamellae is not distinct. Umbilical area is filled by a slightly distinct lamellae and coarse grain spar calcite. Wall of the tube is represented by very thin dark-coloured cryptocrystalline calcareous material (pl. 30, fig. 8).

Comparison: *Lamelliconus multispirus* (pl. 30, figs. 3-4, 6-8) differs from *L. ventroplanus* (Pl. 30, figs. 1-2, 5), *L. biconvexsus* (Pl. 3-2, figs. 1-2, 4), *L.* cf. *biconvexsus* (Pl. 3-2, fig. 3) in having greater height/base ratio. However, its height/base ratio is lesser than that of *L. procerus* (Pl. 31, figs. 1-10).

Age: To Zaninetti 1976, *L. multispirus* (Pl. 10, figs. 1-11, pl. 15, fig. 15) is Late Ladinian-Carnian in age. Rettori (1994) summarized the stratigraphic distribution of the form as Late Anisian-Carnian and he emphasized its probable existence in earlier Norian. In the study *L. multispirus* is found in the late Anisian-Norian interval.

Lamelliconus procerus (LIEBUS, 1942) SALAJ, BORZA & SAMUEL, 1983
Pl. 31. figs. 1-10.

1942 *Turritellella procera* Liebus, pl. 54, fig. 1; pl. 3, figs. 2a-d.
1968 *Trocholina procera*, De Graciansky & Lys, pl. 1, fig. 6.
1983 *Lamelliconus procerus*, Salaj, Borza & Samuel, pl. 107, fig. 2; pl. 125, figs. 2-5

Material: In the Laleköy member of the Camiboğazı Formation, sample no. 1196 and in the Hanaylı member of the Camiboğazı Formation, sample no. 1437, 1438, 1439, 1441, 1453, 1462, 1469, 1470, 1473, 1485, 1490, 1712, 1821, 1827, 1831 and 1840.

Description: Test is conical in shape. It has an excessively great height/base ratio. Proloculus is not distinct. Trochospirally coiled, tubular, undivided second chamber forms whole of the test. As a result of strong recrystallization lateral lamella is not distinct. Umbilical area is filled by slightly distinct lamellae and coarse grain spar calcite. Wall of the tube is represented by very thin dark-coloured cryptocrystalline calcareous material (pl. 31, figs. 4, 6-7, 9).

Comparison: *Lamelliconus procerus* (Pl. 31, figs. 1-10) differs from *L. ventroplanus* (Pl. 30, figs. 1-2, 5), *L. biconvexsus* (Pl. 32, figs. 1-2, 4) and *L.* cf.

biconvexsus (Pl. 32, fig. 3) in having greater height/base ratio. However, its height/base ratio is more than that of *L. multispirus* (pl. 30, figs. 34, 68).

Age: To Zaninetti 1976, *L. multispirus* (Pl. 10, figs. 2-8; pl. 12, figs. 5-8; pl. 15, figs. 11-14, 16) is Late Ladinian/Carnian in age. Rettori (1994) summarized its stratigraphic distribution as Ladinian-Carnian and he emphasized probable existence of the form in earlier Norian. In the study *L. multispirus* is found in Late Anisian-Norian interval.

Lamelliconus biconvexus (OBERHAUSER, 1957)

Pl. 32. figs. 1-2, 4.

1956 *Trocholine* Glintzboeckel, figs. 3-5.

1957 *Trocholina (Trocholina) biconvexa* Oberhauser, pl. 21, figs. 26-37; fig. 1: 35.

1978 *Lamelliconus biconvexus*, Piller, pl. 16, figs. 1-2.

Material: In the Saplazdağı member of the Camiboğazı Formation, sample no 1318 and in the Hanaylı member of the Camiboğazı Formation, sample no. 1437 and 1835.

Description: Test is hemispheric to conical in shape. It has a distinctly small height/base ratio and its umbilical side is slightly convex. Proloculus is not distinct. Trochospirally coiled, tubular, undivided second chamber forms whole of the test. As a result of strong recrystallization lateral and umbilical lamellae are not distinct. Umbilical area is filled by coarse grain spar calcite. Wall of the tube is also represented by light-coloured spar calcite.

Comparison: *Lamelliconus biconvexus* (Pl. 32, figs. 1-2, 4) differs from *L. ventroplanus* (Pl. 30, figs. 1-2, 5) in having convex umbilical side. However, its height/base ratio is much lesser than those of *L. multispirus* (Pl. 30, figs. 3-4, 6-8) and *L. procerus* (Pl. 31, figs. 1-10).

Age: To Zaninetti 1976, *L. multispirus* (Pl. 15, figs. 4-6) is Late Ladinian-Carnian in age. Vachard&Colin (1994) indicated that the form is Late Ladinian-Carnian in age in the Tethyan Area. In the study *L. biconvexsus* is found in Ladinian-Norian interval.

Lamelliconus* cf. *biconvexus (OBERHAUSER, 1957)

Pl. 32. fig. 3.

1956 *Trocholina* Glintzboeckel, figs. 35.

1957 *Trocholina* (*Trocholina*) *biconvexa* Oberhauser, pl. 21, figs. 26-37; fig. 1: 35.

1978 *Lamelliconus biconvexus*, Piller, pl. 16, figs. 1-2.

Material: In the Saplazdağı member of the Camiboğazı Formation, sample no 1318.

Description: Test is hemispheric to conical in shape. It has a distinctly small height/base ratio and its umbilical side is probably convex. Proloculus is not distinct. Trochospirally coiled, tubular, undivided second chamber forms whole of the test. As a result of strong recrystallization lateral and umbilical lamellae are not distinct. Umbilical area is filled by coarse grain spar calcite. Wall of the tube is also represented by light-coloured spar calcite.

Remarks: Although strongly recrystallized, the form is rather similar to *L. biconvexus* (Pl. 32, figs. 1-2, 4) in respect to shape of test.

Age: To Zaninetti 1976, *L. multispirus* (Pl. 15, figs. 4-6) is Late Ladinian-Carnian in age. Vachard&Colin (1994) indicated that the form is Late Ladinian-Carnian in age in the Tethyan Area. In the study *L. biconvexus* is found in Ladinian-Norian interval.

***Lamelliconus* sp.**

Pl. 32. figs. 5- 8.

Material: In the Laleköy member of the Camiboğazı Formation sample no 1221; in the Saplazdağı member of the Camiboğazı Formation, sample no. 1426 and in the Hanaylı member of the Camiboğazı Formation, sample no. 1472 and 1497.

Description: Tests are hemispheric to conical in shape and they have different height/base ratio. Proloculus is not distinct. Trochospirally coiled, tubular, undivided second chamber forms whole of the test. As a result of strong recrystallization lateral and umbilical lamellae is not distinct. Umbilical area is filled by coarse grain spar calcite. Wall of the tube is also represented by light-coloured spar calcite.

Remarks: Some individuals of the genus *Lamelliconus* with different height/base ratio are considered as *Lamelliconus* spp. in this study.

Age: In the study *L. biconvexsus* is found in the Ladinian-Norian time interval.

***Auloconus* PILLER, 1978**

***Auloconus permodiscoides* (OBERHAUSER, 1964)**

Pl. 33, figs. 1-3, 5,7-8.

1956 *Trocholina* sp. Oberhauser, pl. 1, fig. 10.

1964 *Trocholina permodiscoides* Oberhauser, pl. 2, figs. 13-15, 18, 20, 22; pl. 3, fig. 1.

1978 *Auloconus permodiscoides* Piller.

Material: In the Hanaylı member of the Camiboğazı Formation sample no.1719; in the Lower Limestone subunit of the Nohutalan Formation, sample no. 501, 952, 955 and 956.

Description: Test is conical to lenticular in shape. Proloculus is not distinct. Trochospirally coiled, undivided, tubular deuteroloculus forms whole of the test. Umbilical lamina which are two per whorl are not distinct as a result of strong recrystallization. Wall is also represented by light-coloured calcite crystals.

Comparison: In some cases, as it is seen in strong recrystallization conditions which destroys umbilical lamellae, *Auloconus permodiscoides* may be confused with some of the species of the genus *Lamelliconus*. In such cases, *Auloconus permodiscoides* might be differentiated from *Lamelliconus* in having crescent or semi circle-shaped chambers in transversal view.

Age: Zaninetti (1976), reported that the *Trocholina permodiscoides* is Norian-Rhaetian in age.

***Auloconus* spp.**

Pl. 33, figs. 4, 6.

Material: In the Hanaylı Formation of the Camiboğazı Formation sample no. 1459; in the Lower Limestone subunit of the Nohutalan Formation, sample no. 592.

Remarks: Two trochospiral individuals coiled irregularly with well developed umbilical mass were considered as evolutionary species of the genus *Auloconus*.

Age: *Auloconus* spp. is found in Norian-Rhaetian interval.

Triadodiscinae ZANINETTI, 1984

Triadodiscus PILLER, 1983

Triadodiscus eomesozoicus (OBERHAUSER, 1957), PILLER, 1983

Pl. 34, figs. 1-8; pl. 35, figs. 1-10; pl. 36, figs, 1, 2, 4, 6, 9.

1957 *Trocholina (Paratrocholina) eomesozoica* Oberhauser, pl. 21, figs. 38-41; fig. 1: 6-7

1974 *Involutina eomesozoica* Asseroto&Monod, p. 184 (non-figured).

1978 Mesodiscus *eomesozoicus*, Piller, pl. 1, figs. 1-8.

1980 *Involutina eomesozoica* (=*Mesodiscus eomesozoicus*) Oberhauser, Zaninetti & Whittaker, pl. 2, figs. 4-10, 15.

1983 *Permodiscus eomesozoicus*, Salaj, Borza & Samuel, pl.87, figs. 1-7; pl. 88, figs1-5; pl. 89, figs. 1-8.

1983 *Triadodiscus* n. gen. Piller, p. 193 (non-figured).

Material: In the Gerence Formation, sample no. 1072; in the Laleköy member of the Camiboğazı Formation, sample no. 1168, 1170, 1171, 1172, 1184, 1193, 1194, 1195, 1203, 1211, 1212, 1223, 1228, 1233 and 1235; in the Saplazdağı member of the Camiboğazı Formation, sample no. 1272, 1292, 1293, 1297, 1300, 1307, 1308, 1309, 1318, 1322, 1324, 1326, 1327, 1348, 1377, 1379, 1383, 1399, 1384, 1405, 1426, 1800 and 1802; in the Hanaylı member of the Camiboğazı Formation. sample no. 1436, 1491, 1505; 1706, 1732, 1749, 1821, 1822, 1824, 1825, 1826, 1827, 1828, 1829, 1832, 1835, 1839, 1841, 1842, 1853, 1861 and 2104; and in the Lower Limestone subunit of the Nohutalan Formation, sample no. 955,

Remarks: In the study, numerous discoidal to subrhomboidal-shaped individuals which are formed by an involute, planispirally or slightly trochospirally coiled, tubular, undivided chamber are attributed to *Triadodiscus eomesozoicus*. Tubular chambers of the forms are inverse "v" in shape. It is semicircular to crescent in shape in the transversal section and its diameter gradually increases in growth direction. Wall of the form is commonly effected by strong recrystallization. Commonly recrystallized umbilical mass is formed by a complete whorl of single lamella, added at each coiling step of test formation.

Three types of *Triadodiscus eomesozoicus* recorded in the literature and are also recorded in this study. Their common property is smaller dimension of the tubular second chamber. The three types are defined as; i) large, entirely involute test (group I) (Pl. 34, figs. 1-8), ii) early involute, then evolute larger test (group II) (Pl. 35, figs. 2, 6; Sartorio & Verturini, 1988, p. 47, figs 1-2) and iii) small, commonly

involute test with probable evolute stage in the last whorl (group III) (Pl. 35, figs. 7-10) respectively. Besides, while group II and III have a chamber semicircular to crescent in shape, in transversal section, group I (Pl. 34, figs. 1, 6) have a ∧ (inverse "v") shaped chamber, in transversal section. The difference in the shape of tubular chamber seems to be an important evolutionary difference rather than being related to dimorphism which implies that those might belong to different species. The evidences of dimorphism are not distinct. Group III is similar to *Trocholina* (*Paratrocholina*) *eomesozoica* Oberhauser or *Involutina eomesozoica* (Asseroto & Monod). Consequently, it should be stated that evolutionary development of *Triadodiscus eomesozoicus* requires further investigation.

Age: Stratigraphic distribution of the "*Triadodiscus eomesozoicus*" is suggested by Rettori (1994) as Middle Scythian to Carnian and probably Norian-Rhaetian. In this study, the existence of the "form" in the Pre-Middle, Late Anisian to Rhaetian is recorded.

Aulotortidae ZANINETTI, 1984

Aulotortinae ZANINETTI, 1984

Aulotortus WEYNSCHENK, 1956

Aulotortus praegaschei KOEHN-ZANINETTI, 1968

Pl. 36, figs. 3, 5, 7-8, 10. 11.

1969 *Involutina gaschei praegaschei* Koehn-Zaninetti, p. 130, figs. 39 a-l, 42c.

1976 *Angulodiscus praegaschei*, Salaj, pl. 1, p. 530 (non-figured)

1978 *Aulotortus gaschei* Piller, pl. 8, figs. 1-8; pl. 9. figs. 1-6; pl. 10, figs. 1-15.

1983 *Aulotortus praegaschei*, Gazdzicki & Stanley, p. 85, 87, fig. 5: 1-3.

Material: In the Saplazdağı member of the Camiboğazı Formation, sample no. 1406; in the Hanaylı member of the Camiboğazı Formation, sample no. 1506, 1509, 1722, 1724, 1725 and 1853; and in the Lower Limestone subunit of the Nohutalan Formation, sample no. 952, 955, 959 and 960.

Description: Test is ovoid to spherical in shape. Proloculus is not distinct. The entire test is formed by glomospirally coiled, tubular undivided deuteroloculus. Dimensions of the deuteroloculus gradually increase in growth direction. Wall and discontinuous lateral lamellae are recrystallized and they are represented by light-coloured spar calcite.

Comparison: *Aulotortus praegaschei* (Pl. 36, figs. 3, 5, 7-8, 10. 11) differs from *A. friedli* (Pl. 37, figs. 1-9) with respect to the absence of terminal oscillating planispiral stage.

Age: To Zaninetti (1976), *Involutina praegaschei* is Ladinian-Carnian in age. Altıner & Koçyiğit (1993) emphasized that the *A. praegaschei* is found in the Middle Ladinian to Norian interval. Vachard & Colin (1994) noted that the stratigraphic distribution of the *A. praegaschei* is Late Ladinian to Norian. In this study the form is found in the Carnian-Rhaetian interval.

Aulotortus friedli (KOEHN-ZANINETTI & BRÖNNIMANN, 1968)
Pl. 37, figs. 1-9.

1962 *Glomospirella friedli* n. sp. Kristan-Tollmann, pl. 1, figs. 1-9, 12-17.

1968 *Angulodiscus ? gaschei* n. sp. Koehn-Zaninetti & Brönnimann, p. 74, pl. 1, figs. A, 3A, B, C, figs. 3B, C, J.

1976 *Involutina gaschei*, Zaninetti, pl. 9, figs. 13-15.

1976 *Glomospirella friedli*, Zaninetti, pl. 8, figs. 1-5.

1978 *Aulotortus friedli*, Piller, pl. 8, figs. 1-8; pl. 9, figs. 1-6, pl. 10, 1-15.

1983 *Aulotortus gaschei*, Gazdzicki, pl. 32, figs. 9-16.

1983 *Angulodiscus friedly*, Salaj, Borza & Samuel, pl. 106, fig. 1c; pl. 109, figs. 5-11; pl. 110, figs. 1-10; pl. 11, figs. 1-9; pl. 112, figs. 1-4; pl. 113, figs. 1-4; pl. 118, figs. 2-4; pl. 123, fig. 4d.

Material: In the Saplazdağı member of the Camiboğazı Formation, sample no. 1426; in the Hanaylı member of the Camiboğazı Formation, sample no. 1437, 1438,

1441, 1442, 1460, 1461, 1463, 1465, 1485, 1501, 1507, 1509, 1713, 1719, 1722, 1725, 1730, 1735, 1749, 1823, 1824, 1825, 1826, 1827, 1830, 1836, 1838, 1845, 1850, 1858, 1861, 2100 and 2101; and in the Lower Limestone subunit of the Nohutalan Formation, sample no. 957 and 963.

Description: Test is ovoid in shape. Proloculus is not distinct. Coiled, tubular, undivided deuteroloculus forms the whole test. Coiling is glomospiral in the early stage and followed by two or three nearly sigmoidal or strongly oscillated whorls. The last stage is slightly oscillated planispiral. Wall and discontinuous lateral lamellae are recrystallized and they are represented by light-coloured spar calcite.

Comparison: *Aulotortus friedli* (Pl. 37, figs. 1-9) differs from *A. praegaschei* (Pl. 36, figs. 3, 5, 7-8, 10. 11) in having, terminal sigmoidal or strongly oscillated second, and planispiral last stages.

Age: To Zaninetti (1976), *Involutina friedli* is Ladinian-Norian in age. Zamparelli et al. (1995) noted the existence of the *A.* friedli in Carnian-Rhaetian in the Tethyan domain. In this study, the form is found in the Carnian-Rhaetian interval.

Aulotortus* gr. *sinuosus WEYNSCHENK, 1956

Pl. 39. figs. 1-7.

1950 Genus ? species? Weynschenk, pl. 1, fig. 5.

1955 Involutinen Hang, pl. 17, fig. 1.

1956 Aulotortus sinuosus Weynschenk, pl. 6, figs, 1, 3.

1956 Paratrocholina oscillens Oberhauser, fig. 3 (7-11),; pl. 1, figs. 4-7.

1957 Trocholina (Paratrocholina) oscillens, Oberhauser, pl.1, fig. 4; fig. 3 (7-11)

1964 Permodiscus pragsoides var. oscillens, Oberhauser, pl. 2, figs. 1, 4, 12, 17, 19, 21, 24-26,

1968 Involutina sinuosa sinuosa Koehn-Zaninetti, (non illustreted)

1969 Involutina sinuosa sinuosa, Koehn-Zaninetti, fig. 36 (1-3), fig. 37 (3).

Material: In the Hanaylı member of the Camiboğazı Formation, sample no. 1440, 1459, 1463, 1476, 1497, 1480, 1507, 1820, 1826, 1828, 1848, 1850 and 1853, and in

the Lower Limestone subunit of the Nohutalan Formation, sample no. 952, 955, 956, 957 and 960.

Description: Test is subspherical to lenticular in shape. Proloculus is not distinct. Coiled, tubular, undivided deuteroloculus forms the whole test. Dimensions of tubular chamber increase in growth direction. Its transversal view is semicircular to crescent in shape. The coiling is irregularly oscillated planispiral involute. Wall and umbilical lamellae are recrystallized and represented by light-coloured spar calcite.

Comparison: *Aulotortus* gr. *sinuosus* (pl. 39, figs. 1-7) differs from *A. sinuosus pragsoides* (pl. 38, figs. 1-7) in having early and/or irregularly oscillating planispiral coiling.

Age: To Zaninetti (1976), *Involutina* gr. *sinuosa* is Middle Anisian-Rhaetian in age. Altıner & Koçyiğit (1993) emphasized that the *A.* gr. *sinuosus* is found in the Middle Anisian to Rhaetian interval in Turkey. In this study *A.* gr. *sinuosus* represents *A.* gr. *sinuosus sinuosus* and or *A. sinuosus oberhauseri* and is found in the Norian-Rhaetian time interval.

Aulotortus sinuosus (WEYNSCHENK, 1956) ***pragsoides*** (OBERHAUSER, 1964)
Pl. 38, figs. 1-7.

1964 *Permodiscus pragsoides* Oberhauser, pl. 1, figs 10, 12-14, 16, 17; pl. 2, figs. 2-3, 16, 23; pl. 4. figs. 8-9.
1964 *Involutina* sp., Cros&Neuman, pl.3, fig. 12.
1965 *Permodiscus pragsoides* var. *oscillens*, Bosellini&Broglio-Loriga, pl. 1, fig. 6
1966 *Arenovidalina pragsoides*, Salaj, Bielly & Bistricky, (not figured)
1968 *Involutina sinuosa pragsoides*, Koehn-Zaninetti fig. 25, fig. 37: 1, 4-6.
1969 *Aulotortus oscillens*, Salaj, pl.2, fig. 2.
1970 *"Permodiscos" pragsoides*, Czurda & Nicklas, pl. 2, fig. 3.

Material: In the Laleköy member of the Camiboğazı Formation, sample no. 1151, 1203, 1211 and 1212.

Description: Test is subspherical to lenticular in shape. Proloculus is not distinct. Coiled, tubular, undivided deuteroloculus forms the whole test. Dimensions of tubular chamber increase in growth direction and its transversal view is semicircular to crescent in shape. The coiling is involute, planispiral and oscillated in last few whorls. Wall and umbilical lamellae are recrystallized and they are represented by light-coloured spar calcite.

Comparison: *Aulotortus sinuosus pragsoides* (Pl. 38, figs. 1-7) differs from *A.* gr. *sinuosus* (pl. 39, figs. 1-7) in having planispiral coiling oscillating in late whorls.

Age: To Zaninetti (1976), *Involutina sinuosa pragsoides* is Middle Anisian-Rhaetian in age. Altıner & Koçyiğit (1993) emphasized that the *A. sinuosus pragsoides* is found in the Middle Anisian to Rhaetian interval in Turkey. In this study the *A. sinuosus pragsoides* is found in the Late Anisian to Ladinian limestone.

Aulotortus communis (KRISTAN, 1957)

Pl. 40, figs. 1-9.

1950? *Nummulostegina* Weynschenk, pl. 3, fig. 27.
1957 *Angulodiscus communis*, Kristan, pl. 23, fig. 1-7.
1957 *Angulodiscus macrostoma*, Kristan, pl. 23, fig. 8-9.
1964 *Permodiscus pragsoides*, Oberhauser, pl. 2, fig. 1.
1964 *Permodiscus* ex. gr. *communis*, Oberhauser, pl. 2, figs. 5-7.
1964 *Aulotortus* sp. Cros & Neuman, pl. 1, fig. 10-12, 14, pl. 3, figs. 1, 6.
1968 *Involutina communis*, Koehn-Zaninetti, (non-figured).
1970 *Involutina communis*, Brönnimann, Poisson & Zaninetti, pl. 2, figs. 1-2.

Material: In the Hanaylı member of the Camiboğazı Formation, sample no. 1438, 1439, 1442, 1443, 1445, 1449, 1459, 1460, 1467, 1472, 1476, 1485, 1491, 1492,

1497, 1499, 1501, 1719, 1727, 1828, 1837, 1849, 1850, 1853 and 1601; and in the Lower Limestone subunit of the Nohutalan Formation, sample no. 930, 952, 956, 957, 960, 963 and 2284.

Description: Test is lenticular to elipsoidal in shape. Proloculus is not distinct. Coiled, tubular, undivided deuteroloculus forms the test. Dimensions of tubular chamber increase in growth direction and its transversal view is semicircular to crescent in shape. Coiling is planispiral involute and may slightly be oscillated in the early whorls. Last whorls are generally regular planispiral. Last one or two whorls are puffed towart exterior. Wall and umbilical lamellae are recrystallized and they are represented by light-coloured spar calcite.

Comparison: Aulotortus communis differs from *Aulotortus gr. sinuosus* (Pl. 39, figs. 1-7) in having regular planispiral last whorls and from A. tumidus (Pl. 41, figs 1-2, ?3) absence of late evolute whorls .(Pl. 38, figs. 1-7).

Age: To Zaninetti (1976), *Involutina comunis* is Norian-Rhaetian in age. Altıner & Koçyiğit (1993) emphasized that the *A.* communis is found in the Norian-Rhaetian interval in Turkey. In this study the age of the form is also accepted as Norian-Rhaetian time interval.

Aulotortus tumidus (KRISTAN-TOLLMANN, 1964)

Pl. 41, figs. 1-2, 3?.

1959 *Involutina* cf. *jonesi* Leischner, pl. 4, fig. 10.

1959 *Involutina*, Leischner, pl. 4, fig.12.

1961 *Involutina* cf. *liassica*, Misik, pl. 30, fig. 2.

1962 *İnvoluteeina turgida*, Kristan-Tollmann, pl. 1, fig. 23.

1962 *Angulodiscus* sp., Kristan-Tollmann, pl. 1, fig. 24.

1964 *Angulodiscus tumidus*, Kristan-Tollmann, abb. 3, figs. 1-6, abb. 3, 6.

1966 *Arenovidalina tumida*, Salaj, Biely & Bistricky, (not figured)

1967 *Arenovidalina planidiscoides*, Salaj, Biely & Bistricky, pl. 5, fig. 2.

1968 *Involutina tumida*, Koehn-Zaninetti, (not figured).

1969 *Involutina tumida*, Koehn-Zaninetti, fig. 35 (5-9).

1975 *Involutina tumida*, Hohenegger & Piller, pl. 3, fig. 2.

Material: In the Hanaylı member of the Camiboğazı Formation, sample no. 1473, 1822? and 1834, and in the Lower limestone subunit of the Nohutalan Formation, sample no. 930 and 955.

Description: Test is lenticular in shape. Proloculus is not distinct. Coiled, tubular, undivided deuteroloculus forms the test. Dimensions of tubular chamber slightly increase in growth direction and its transversal view is semicircular in shape. Coiling is planispiral involute and may slightly oscillate in the latest whorls. Last two or three whorls are evolute. Wall and umbilical lamellae are recrystallized and they are represented by light-coloured spar calcite.

Comparison: *Aulotortus tumidus* (Pl. 41, figs. 1-2, 3?) differs from *A. tenius* (Pl. 41, figs. 3, 6-9) in having planispiral evolute coiling in its latest whorls.

Age: To Zaninetti (1976), *İnvolutina tumidus* is Carnian-Rhaetian in age. Altıner & Koçyiğit (1993) emphasized that *A.* tumidus is found in the Carnian to Rhaetian interval in Turkey. In this study the *A. tumidus* is found in Norian-Rhaetian.

Aulotortus* ? *impressus (KRISTAN-TOLLMANN, 1964)

Pl. 41, figs. 5-6.

1962 *Angulodiscus* sp. Kristan-Tollmann, pl. 1, fig.25.

1969 *Angulodiscus impressus*, Kristan-Tollmann, abb. 2, figs. 11-13.

1967 *Semiinvolutea clari*, Salaj, Biely & Bistricky, pl. 6, fig. 1.

1968 *Involutina impressa*, Koehn-Zaninetti Brönnimann, (not figured).

1969 *Involutina impressa*, Koehn-Zaninetti, fig. 34, 36 (8-11).

Material: In the Hanaylı member of the Camiboğazı Formation, sample no. 1472 and 1861 and in the Lower limestone subunit of the Nohutalan Formation, sample no. 952?.

Description: Test is lenticular in shape. Proloculus is not distinct. Coiled, tubular, undivided deuteroloculus forms the test. Dimensions of tubular chamber slightly increase in growth direction and its transversal view is semicircular in shape. Coiling is involute planispiral and may be slightly oscillating. Umbilical mass may be slightly compressed in the central area. Wall and umbilical lamellae are recrystallized and they are represented by light-coloured spar calcite.

Comparison: *Aulotortus* ? *impressus* (Pl. 41, figs. 5-6) differs from *A. tumidus* (Pl. 41, figs. 1-2, 3?) in having slightly compressed umbilical mass and by the absence of the evolute final stage. The test of the *A. impressus* is greater than test of *A. tenuis* (Pl. 41, figs. 4, 7-10) and its umbilical mass is more developed and slightly concave on one side of the umbilicus.

Age: To Zaninetti (1976), *Involutina impressus* is Carnian-Rhaetian in age. In this study the *A.* ? *impressus* is found in the Norian-Rhaetian interval.

Aulotortus tenuis (KRISTAN,1957)

Pl. 41. figs. 4, 7-10.

1957 *Angulodiscus* Kristan, pl. 22, fig. 18.

1964 *Neoangulodiscus tenuis*, Cros & Neumann, pl. 8, fig. 8.

1965 *Involutina* cf. *planidiscoides* Bosellini & Broglio Loriga, pl. 1, fig. 2.

1967 *Arenovidalina tumida*, Salaj, Biely & Bistricky, pl. 4, fig. 1.

1968 *Involutina tenuis*, Koehn-Zaninetti & Brönnimann, (non figured)

1969 *İnvoluteeina tenuis*, Koehn-Zaninetti, fig. 33, A-J.

1984 Aulotortus ex gr. tenuis, Ciarapica & Zaninetti, pl. 1, fig. 9.

Material: In the Hanaylı member of the Camiboğazı Formation, sample no. 1463, 1485, 1491, 1497, 1501, 1506, 1822, 1830?, 1832,18342, 1844, 1850 and 1661 and in the Lower limestone subunit of the Nohutalan Formation, sample no. 930, 952, 955 and 959.

Description: Test is discoidal in shape. Proloculus is not distinct. Coiled, tubular, undivided deuteroloculus forms the test. Dimensions of tubular chamber slightly increase in growth direction and its transversal view is semicircular in shape. Coiling is planispiral involute and may be slightly oscillated. Umbilical mass is flattened. Wall and umbilical lamellae are recrystallized and they are represented by light-coloured spar calcite.

Comparison: *Aulotortus tenuis* (Pl. 41. figs. 4, 7-10) differs from *A. tumidus* (Pl. 41. figs. 1-2, 3?) and *A. impressus* (Pl. 41, figs. 5-6) in having smaller test size and less developed and flattened umbilical mass.

Age: To Zaninetti (1976), *Involutina tenuis* is Carnian-Rhaetian in age. Altıner & Koçyiğit (1993) emphasized that the *A. tenuis* is found in the Carnian to Rhaetian interval in Turkey. In this study the form is found in the Norian-Rhaetian interval

***Aulotortus* spp.**

Pl. 42, figs. 1-6.

Material: In the Laleköy member of the Camiboğazı Formation, sample no. 1170, 1180 and 1203; in the Saplazdağı member of the Camiboğazı Formation, sample no. 1328, 1363 and 1438 and in the Hanaylı member of the Camiboğazı Formation, sample no. 1443, 1445, 1459, 1474, 1485, 1507 and 1508.

Remarks: In the study, some lenticular to discoidal-shaped individuals with coiled undivided tubular chambers are attributed to the genus *Aulotortus*. They have more or less developed umbilical mass or lateral lamina. Their coiling is regular or oscillated planispiral. The dimension of the tubular chamber increases in growth

direction and the shapes of the chambers are semicircular to crescent in the transversal view. Due to the inefficiency of the data, the mentioned individuals are identified as *Aulotortus* spp.

Age: The individuals belonging to *Aulotortus* spp. (Pl. 42, figs. 1-6) are found in the Late Anisian to Rhaetian interval.

***Aulotortus* sp. or *Glomospirella* sp.**

Pl. 47, fig. 7.

Material: In the Hanaylı member of the Camiboğazı Formation, sample no. 1501.

Remarks: The presented form might be compared with *Aulotortus tenuis* (Pl. 41. figs. 4, 7-10) and *Glomospirella* gr. *expansa* (Pl. 26, figs. 4-8, 10). However, due to the strong recrystallization, the generic properties of the form is not recognizable.

Age: The form is found in Norian.

Triasininae LOEBLICH & TAPPAN, 1986

Triasina MAJZON, 1954

Triasina oberhauseri KOEHN-ZANINETTI & BRÖNNIMANN, 1968

Pl. 43, fig. 1, 3.

1966 *Trisina hantkeni*, Salaj, Biely & Bistricky, pl. 2, fig. 4b.

1968 *Triasina oberhauseri* Koehn-Zaninetti, Koehn-Zaninetti & Brönnimann, pl. 1, figs. 1-2; fig. 2 in text.

Material: In the Hanaylı member of the Camiboğazı Formation, sample no. 1507 and in the Güvercinlik Formation, sample no. 1853, 2337 and 2347.

Description: Test is lenticular to spherical in shape. Coiled, tubular, undivided deuteroloculus forms the test. Coiling is planispiral involute and irregular in the early

and regular the late whorls. The deuteroloculus is occupied by a cylindrical pillar extending from the floor to the roof of the tubular chamber. Umbilical mass is well developed. Wall is represented by light-coloured spar calcite.

Comparison: *Triasina oberhauseri* (Pl. 43, fig. 1-3) differs from *Triasina hantkeni* (Pl. 43. figs. 2, 4-8) in having a less developed pillar, in the late whorls. *Triasina hantkeni* has a more developed pillar.

Age: To Zaninetti (1976, pl. 14, fig. 23; pl. 15, fig. 1) and Abate et al. (1984, p. 20, fig. 1) *Triasina oberhauseri* is Norian in age. To Altıner & Koçyiğit (1993) *T. oberhauseri* is Norian- Earliest Rhaetian in age. In this study the form is also Norian in age.

Triasina hantkeni MAJZON, 1954

Pl. 43, figs. 2, 4-8.

1950 *Genus? species?* Weynschenk, pl. 1, fig. 6.

1953 Foraminifer oder Hydrozoenkolonie ? Speck, pl. 12, figs, 35-37.

1953 *Triasina hantkeni* Majzon, pl. 1, figs. 1, 2; pl. 2, figs. 3-4; pl. 3. fig. 6.

Material: In the Lower limestone subunit of the Nohutalan Formation, sample no. 930, 952, 953, 956, 960 and 2284.

Description: Test is biumbilical and subspherical in shape. Coiled, tubular, undivided deuteroloculus is flat and wide, and forms the whole test. Coiling is planispiral and involute. The deuteroloculus is occupied by abundant cylindrical pillars extending from the floor to the roof of the tubular chamber. Umbilical mass is well developed. Wall is represented by light-coloured spar calcite.

Comparison: The *Triasina hantkeni* (Pl. 43. figs. 2, 4-8) differs from *Triasina oberhauseri* (Pl. 43, fig. 1-3) in having more developed pillars along the entire test.. *Triasina oberhauseri* has less developed pillars in late whorls.

Age: To Zaninetti (1976), Abate & Zaninetti (1984), Peybernes et al. (1988) and Altıner & Koçyiğit (1993, in Turkey) *Triasina hantkeni* is the Rhaetian in age. In this study the form is also Rhaetian in age.

MILIOLINA DELAGE &HEROUARD, 1896

Cornuspiracea SCHULTZE, 1854

Arenovidalinidae ZANINETTI, RETTORI, in ZANINETTI, RETTORI, HE & MARTINI, 1991

Arenovidalininae ZANINETTI, RETTORI, in ZANINETTI, RETTORI, HE & MARTINI, 1991

Arenovidalina HO, 1959

Arenovidalina amylovoluta HO, 1959

Pl. 44, figs. 1-4.

1959 *Arenovidalina amylovoluta*, n. sp. Ho, pl. 7, figs. 10-17.

1965 *Hemigordius depressus*, n. sp. Lupperto, pl. 8, fig. 9; pl. 9, figs. 1-3.

1969 *Hemigordius*? aff. *amylovolutus*, Koehn-Zaninetti, pl. 2, fig. D.

1976 *Ophthalmidium*? *amylovolutum*, Zaninetti, pl. 3, figs. 12-13.

1977 *Hemigordius*? *amylovolutus*, Trifonova, pl. 3. fig. 9.

1978 *Ophthalmidium*? *amylovolutum*, Dağer, pl. 2, fig. 10.

1990 *Arenovidalina amylovoluta*, Baroz, Martini & Zaninetti, pl. 4, figs. 8-9.

1991 *Arenovidalina amylovoluta*, Zaninetti, rettori, He & Martini, pl. 1, fig. 14.

1993 *Arenovidalina amylovoluta*, He, pl. 4, figs. 1-4.

Material: In the Gerence Formation, sample no. 1072 and 1115; in the Laleköy member of the Camiboğazı Formation, sample no. 1147; in the Saplazdağı member of the Camiboğazı Formation, sample no. 1318 and 1338 and in the Hanaylı member of the Camiboğazı Formation, sample no. 1444.

Description: Test is lenticular in shape. Proloculus is not distinct. It consists of closely coiled, slender, tubular undivided second chamber. Coiling is involute planispiral, oscillating in the early and regular in the late whorls. Umbilical sides are

occupied by a dark-coloured microgranular calcitic material. Light-coloured calcitic laminae might be added per whorl. The umbilical mass is compressed in its central area. Wall is thin, simple and is made up of dark-coloured porcelaneous carbonate material.

Comparison: The *Arenovidalina amylovoluta* (pl. 44, figs. 1-4) differs from *A. chialingchiangensis* (Pl. 44, figs. 8-10; pl. 45, figs. 1-3) in having compressed umbilical mass, and from *Arenovidalina* spp. (Pl. 44, figs. 5-7) in lacking a streptospiral stage in the early whorls. Besides, dimension of the tubular chamber of *A. amylovoluta* is smaller than those of *Arenovidalina* spp.

Age: Stratigraphic distribution of the *A. amylovoluta* is suggested by Rettori (1995), as Middle Scythian to Early-Middle Anisian and probably, Middle Scythian and Late-Middle Anisian to Ladinian. In this study the form is found in the Middle, Late Anisian to Ladinian and probably Carnian interval.

Arenovidalina chialingchiangensis HO, 1959

Pl. 44, figs. 8-10; pl. 45, figs. 1-3.

1959 *Arenovidalina chialingchiangensis* n. sp. Ho, pl. 6, figs. 13-28.

1959 *Arenovidalina chialingchiangensis* var. *rhombea* Ho, pl. 7, figs. 4-7, 9.

1959 *Arenovidalina chialingchiangensis* var. *major* Ho, pl. 7, figs. 1-3.

1964 *Aulotortus chialingchiangensis*, Loeblich & Tappan, fig. 606: 4-5.

1967 *Arenovidalina ovulum*, n. sp. Salaj in Salaj, Biely & Bistricky, pl.5, fig.1.

1969 *Hemigordius*? aff. *chialingchiangensis*, Koehn-Zaninetti, pl. 1, figs. A-F; pl. 2, fig. A (A), F.

1976 *Ophthalmidium chialingchiangensis*, Zaninetti, pl. 3, figs, 6, 9-10, non figs, 7-8.

1978 *Hemigordius chialingchiangensis*, Trifonova, pl. 1, fig. 2.

1983 *Lammelliconus ovatus*, Salaj, Borza & Samuel, pl. 107, fig. 4.

?1993 *Ophthalmidium (=Arenovidalina) chialingchiangensis*, Senowbari-Daryan, Zühlke, Bechstadt & Flügel, pl. 65, fig. 10.

Material: In the Gerence Formation, sample no. 1072 and 1115; in the Laleköy member of the Camiboğazı Formation, sample no. 1146, 1149, 1150, 1185, 1192, 1196, 1200, 1202, 1223, 1228, 1234, 737, 734 and 733 and in the Saplazdağı member of the Camiboğazı Formation, sample no. 1286, 1343 and 1382.

Description: Test is lenticular in shape. It consists of spherical proloculus and Coiled, undivided and tubular second chamber. Coiling is planispiral involute and slightly oscillating in median whorls. Last whorl is evolute. Tubular chamber is semispherical to spherical in shape, in the transversal sections. Its dimension rapidly increases in growth direction. Umbilical sides are occupied by a dark-coloured microgranular calcitic material with light-coloured calcitic laminae added per whorl. The umbilical mass is well developed. Wall is thin, simple and is made up of dark-coloured micritizied porcelaneous carbonate material.

Comparison: The *Arenovidalina chialingchiangensis* (Pl. 44, figs. 8-10; pl. 45, figs. 1-3) differs from *A. amylovoluta* (Pl. 44, figs. 1-4) in having well developed umbilical mass, greater dimensions of tubular chamber, evolute last whorl, and from *Arenovidalina* spp. (Pl. 44, figs. 5-7), in lacking a streptospiral early stage. Also its umbilical mass is more inflated than that of *Arenovidalina* spp.

Age: Stratigraphic distribution of the *A. chialingchiangensis* is suggested by Rettori (1995), as Late Scythian to Early-Middle Anisian and probably Middle Scythian, Late-Middle Anisian to Ladinian. In this study the form is found in the Middle, Late Anisian to Ladinian interval.

***Arenovidalina* spp.**

Pl. 44, figs. 5-7.

Material: In the Gerence Formation, sample no. 1072 and in the Laleköy member of the Camiboğazı Formation, sample no. 737.

Description: Tests are lenticular in shape. It consists of spherical proloculus and Coiled, undivided and tubular second chamber. Coiling is planispiral involute in each

form and it is slightly oscillating or streptospiral in the early whorls. Last whorl is evolute in each form. Tubular chamber is semispherical to spherical in shape in transversal sections. Its dimension slightly or rapidly increases in growth direction. Umbilical sides are occupied by a dark-coloured microgranular calcitic material. The umbilical mass is less developed. Wall is thin, simple and it is made up of dark-coloured micritizied porcelaneous carbonate material.

Comparison: The *Arenovidalina* spp. (Pl. 44, figs. 5-7) differs from *A. amylovoluta* (Pl. 44, figs. 1-4) and *Arenovidalina chialingchiangensis* (Pl. 44, figs. 8-10; pl. 45, figs. 1-3) in having greater dimensions of tubular chamber and streptospiral early stage.

Age: In the study the form is found in the Pre-Middle Anisian and/or Middle Anisian.

Cornuspiridae SCHULTZE, 1854

Cornuspirinae SCHULTZE, 1854

Cornuspira SCHULTZE, 1854

***Cornuspira* ? sp.**

Pl. 45. fig. 4.

Material: In the Laleköy member of the Camiboğazı Formation, sample no. 737.

Description: Test is discoidal in shape. Proloculus is not distinct. Coiled, undivided and tubular second chamber forms the whole test. Coiling is planispiral and evolute. Dimension of the tubular chamber increases in growth direction. Wall is calcareous and porcelaneous. It is thin and simple.

Age: In the study, the *Cornuspira*? sp. is Middle Anisian in age.

Calcivertellininae LOEBLICH & TAPPAN, 1964

Planiinvoluta LEISCHNER, 1961

***Planiinvoluta* sp.**

Pl. 45. figs. 5-6, 8.

Material: In the Saplazdağı member of the Camiboğazı Formation, sample no. 1803 and in the Hanaylı member of the Camiboğazı Formation, sample no. 2105 and 2107.

Description: Test is attached and flattened discoidal in shape. Globular proloculus is followed by an undivided tubular second chamber. Coiling is irregular. It is evolute against the attached side and involute in the unattached side. Dimension of the tubular chamber increases in growth direction. Wall is made up of dark-coloured microgranular calcareous material.

Age: The *Planiinvoluta* sp. is found in the uppermost part of the Saplazdağı and lowermost part of the Hanaylı Members of the Camiboğazı Formation and it is probably Carnian in age. The genus *Planiinvolutea* is reported in Late Triassic (Zaninetti, 1976; Loeblich & Tappan, 1988).

Meandrospiridae (SAIDOVA, 1981) ZANINETTI ET AL., 1987

Meandrospirinae (SAIDOVA, 1981) ZANINETTI ET AL., 1987

Meandrospira LOEBLICH &TAPPAN, 1946

Meandrospira cheni (HO, 1959)

Pl. 45, fig. 7.

Material: In the Gerence Formation, sample no. 1115.

Remarks: In the study, one specimen formed by an undivided tubular chamber is attributed to *Meandrospira cheni* (Pl. 45, fig. 7). It has similarities in respect to coiling and dimensions of test with *M. cheni* presented by Rettori (1995, pl. 19, figs. 18-22). However, local thickening of its wall is misleading.

Age: Stratigraphic distribution of *Meandrospira cheni* is suggested by Rettori (1995), as Late Scythian. In this study the form is found together with Early-Middle Anisian *M. dinarica* and Middle, Late Anisian *Glomospira densa*. Thus, it is considered that the age of the form might be extended to Middle Anisian.

?"***Meandrospira*" *deformata*** SALAJ, in SALAJ, BIELY & BYSTRICKY, 1967

Pl. 45, fig. 9.

1967 *Meandrospira deformata* n. sp., Salaj, in Salaj, Biely & Bystricky, pl. 2, figs. 3: a-d.

1976 *Meandrospira deformata*, Zaninetti, pl. 1, figs. 20-22.

Material: In the Laleköy member of the Camiboğazı Formation, sample no. 1162.

Description: Proloculus is not distinct. The Coiled, undivided and tubular second chamber forms the whole test. Coiling is meandrospiral and irregular. Dimension of tubular chamber slightly increases in growth direction. Wall is made up of dark-coloured microgranular calcareous material.

Comparison: The form (pl. 45, fig. 9) differs from *M. cheni* (Pl. 45, fig. 7), *M. pusilla* (Pl. 46, figs. 6-8) and *M. dinarica* (Pl. 46, figs. 1-5) in having irregular meandrospiral coiling.

Age: In Rettori (1995) the age of "Meandrospira" deformata is suggested as Anisian. In this study the form is found in late Anisian.

Meandrospira dinarica KOCHANSKY-DEVIDE & PANDIC, 1965

Pl. 46, figs. 1-5.

1965 *Meandrospira dinarica* n. sp. Kochansky-Devide & Pandic, pl. 3, figs. 9-11, pl. 4, figs. 1-10.

1993 *Meandrospira dinarica*, Trifonova, pl.5, figs. 10 11.

1993 *Meandrospira dinarica*, Altıner & Koçyiğit, pl. 5, figs. 1-4.

1994 *Meandrospira dinarica*, Zaninetti Rettori & Mrtini, pl.2, fig. 14.

Material: In the Gerence Formation, sample no. 1115 and in the Laleköy member of the Camiboğazı Formation, sample no. 737.

Description: Test is ovate in shape and circular in transversal view. Spherical proloculus is followed by Coiled, undivided and tubular second chamber. The tubular chamber is almost rectangular in its transversal view. Coiling is meandrospiral. Dimension of the tubular chamber increases in growth direction. Numbers of whorls are 2,5-3 and 4-5 meandrospires are present in each whorl. Wall is made up of porcelaneous calcareous material.

Comparison: The form (Pl. 46, figs. 1-5) differs from *M. cheni* (Pl. 445, fig. 7), *M. pusilla* (Pl. 46, figs. 6-8) and "*Meandrospira*" *deformata* (Pl. 45, fig. 9) in having almost rectangular transversal view of tubular chamber.

Age: The age of *Meandrospira dinarica* is considered as Anisian. Rettori (1995) proposed an Early to Middle Anisian age for the form. The form is Early-Middle Anisian in age, in this study.

Meandrospira pusilla (HO, 1959)

Pl. 46, figs. 6-8.

1959 *Trochamminoides pusillus* n. sp. Ho, pl. 7, figs. 18-29, pl. 8, figs. 1-5.

1959 *Trochamminoides flosculiformis* n. sp. Ho, pl. 8, figs. 6-10.

1959 *Trochamminoides isolitus* n. sp. Ho, pl. 8, fig. 11?, pl. 12, 13-15.

1959 *Trochamminoides cheni* n. sp. Ho, pl. 8, figs. 16-18-29.

1964 *Citaella iulia* n. sp. Premoli-Silva, pl. 48, figs. 1-20; pl. 49, figs. 1-20; pl. 50, figs. 1-7 ; pl. 51, fig. 5.

1966 *Meandrospira iulia*, Kochansky-Devide & Pantic, pl. 2, figs. 1-15, pl.1, figs. 4-8, fig. 5.

1969 *Meandrospira insolita* Salaj, pl. 1, fig. 2, pl. 2, fig. 1.

1986 *Meandrospira pusilla* Sudar, pl. 1, figs. 4- ?5, pl. 28, fig. 2.

1994 *Meandrospira pusilla*, Rettori, Angiolini & Muttoni, pl. 1, fig. 1; pl. 4, fig.14.

Material: In the Laleköy member of the Camiboğazı Formation, sample no. 737.

Description: Test is ovate in shape and circular in transversal view. Spherical proloculus is followed by Coiled, undivided and tubular second chamber. Coiling is meandrospiral. Dimension of the tubular chamber increases in growth direction. Transversal section of the tubular chamber is circular. Numbers of whorls are 2,5-3 and 4-5 meandrospires are present in each whorl. Wall is made up of porcelaneous calcareous material.

Comparison: The form (Pl. 46, figs. 6-8) differs from *M. dinarica* (Pl. 46, figs. 1-5) in having clearly circular transversal view of tubular chamber, from *M. cheni* (Pl. 445, fig. 7), "*Meandrospira*" *deformata* (Pl. 45, fig. 9) and *Meandrospira* sp. (Pl 45, figs. 10-11) in having a more developed meandrospiral coiling.

Age: The age of *Meandrospira dinarica* is suggested by Rettori (1995) as Middle Scythian to Middle Anisian. In this study, the form is found with together with *M. dinarica*, *Glomospira densa* and *Paulbrönnimannia judicariensis*, in the Middle, Anisian.

***Meandrospira*? sp.**

Pl. 45. Fig. 10-11.

Material: In the Laleköy member of the Camiboğazı Formation, sample no. 1161 and 1163.

Description: Spherical proloculus is followed by a Coiled, undivided and tubular second chamber. Coiling is meandrospiral. Dimension of the tubular chamber is constant. Transversal section of the tubular chamber is circular. Numbers of whorls are 1-1,5 and 3 meandrospire are present per whorl. Wall is made up of porcelaneous calcareous material.

Comparison: The *Meandrospira*? sp. can be compared with genus *Meandrospira* with respect to the form of coiling and properties of tubular chamber. The form (Pl 45, figs. 10-11) (Pl. 46, figs. 6-8) differs from *M. dinarica* (Pl. 46, figs. 1-5), *M. cheni* (Pl. 445, fig. 7), "*Meandrospira*" *deformata* (Pl. 45, fig. 9) and *Meandrospira pusilla* (Pl. 46, figs. 6-8) in having less developed meandrospiral coiling.

Age: In the study, the form is Late Anisian in age.

Turriglomininae ZANINETTI, in LIMONGI, PANZANELLI-FRATONI, CIARAPICA, CIRILLI, MARTINI,SALVINI-BONNARD & ZANINETTI, 1987

Turriglomina ZANINETTI, in LIMONGI, PANZANELLI-FRATONI, CIARAPICA, CIRILLI, MARTINI,SALVINI-BONNARD & ZANINETTI, 1987

Turriglomina magna (UROSEVIC, 1977)

Pl. 46, figs. 9-12; pl. 47, figs. 1-2, 8.

1977 "*Turritellella*" *mesotriasica* Koehn-Zaninetti, Urosevic, pl. 1, figs. 1-9, 10?, 11-15.

1981 *Turritellella magna*, n. sp. Urosevic, pl. 1, figs. 1-2.

1987 *Turriglomina mesotriasica*, Limongi, Panzanelli-Fratoni, Ciarapica, Crilli, Martini, Salvini-Bonnard & Zaninetti, fig. 2A, B.

1987 *Turriglomina mesotriasica*, form B, or Turriglomina n. sp., or *Turriglomina?*, Zaninetti, Ciarapica, Martini, Salvini-Bonnard & Rettori, pl. 1, figs. 5-6.

1988 *Glomoturritellella magna*, Urosevic, pl. 2, fig. 1;1a-5.

1990 *Turriglomina magna*, Ciarapica et al., figs. 4B-C.

Material: In the Laleköy member of the Camiboğazı Formation, sample no. 1170, 1171, 1194 and 736 and in the Saplazdağı member of the Camiboğazı Formation, sample no. 1296, 1303, 1324 and 1341.

Description: First stage is not distinct. The second stage is formed by a Coiled, undivided and tubular second chamber. Coiling of the second stage is helicoidal. Tubular chamber is circular in transversal section. A thin columella is present in the centre of helicoidal coiling. Diameter of the tubular chamber is relatively large. Wall is made up of dark-coloured microgranular calcareous material. It is relatively thick and simple.

Comparison: *Turriglomina magna* (Pl. 46, figs. 9-12; pl. 47, figs. 1-2, 8) differs from *T. mesotriasica* (Pl. 47. figs. 3-4) in having larger tube diameter and a thicker wall.

Age: Stratigraphic distribution of the form is suggested by Rettori (1995) as Middle Anisian to Norian. In this study, it is found in the Middle, Late Anisian to Ladinian time interval.

Turriglomina mesotriasica (KOEHN-ZANINETTI, 1968)
pl. 47. figs. 3-4.

1945 *Turritellella* Wirz, pl. 74, fig. 10.
1966 *Turritellella* sp. nov. Hirsch, pl. 2, fig. 10.
1968 *Turritellella mesotriasica* n. sp., Koehn-Zaninetti, nomen nudum.
1969 *Turritellella mesotriasica*, Koehn-Zaninetti, pl. 3, figs. G-F; fig. 4 in text.
1987 *Turriglomina mesotriasica*, Limongi, Panzenelli-Fratoni, Ciarapica, Cirilli, Martini, Salvini-Bonnard & Zaninetti, not figured.

Material: In the Laleköy member of the Camiboğazı Formation, sample no. 1171 and 1261.

Description: Test is elongate, slender and cylindrical in shape. Proloculus is not distinct. Coiled, undivided and tubular second chamber forms the test. It consists of two stages. First stage is glomospiral or meandrospiral, and it is not distinct. Second stage is helicoidal. Tubular chamber is circular in transversal section. The height of the whorls slightly increases in growth direction. A thin columella is present in the centre of helicoidal coiling. Diameter of the tubular chamber is relatively small. Wall is made up of dark-coloured microgranular calcareous material. It is relatively thin and simple.

Comparison: *Turriglomina mesotriasica* (Pl. 47. figs. 3-4) differs from *T. magna* (Pl. 46, figs. 9-12; pl. 47, figs. 1-2, 8) in having smaller tube diameter and thinner wall.

Age: Stratigraphic distribution of the form is suggested by Rettori (1995) as the Middle Anisian-Ladinian and probably Early Anisian. In this study it is found in the Late Anisian-Ladinian interval.

Turriglomina scandonei ZANINETTI, CIARAPICA, MARTINI,SALVINI-BONNARD & RETTORI, 1987

Pl. 47, figs. 9-10.

1987 *Turriglomina scandonei* Zaninetti, Ciarapica, Martini, Salvini-Bonnard & Rettori, pl. 1, figs. 1, 3, 5-6.

Material: In the Laleköy member of the Camiboğazı Formation, sample no. 1262.

Description: Test is large, elongate, slender and cylindrical in shape. Spherical proloculus is followed by coiled, undivided and tubular second chamber. It consists of two stages. The first stage is meandrospiral consisting of a few meandrospiral whorls and a planispiral last whorl. The second stage is helicoidal. Tubular chamber is circular in transversal section. The height of the whorls slightly increases in

growth direction. A thin columella is present in the centre of helicoidal coiling. Diameter of the tubular chamber is relatively large. Wall is made up of dark-coloured microgranular calcareous material. It is relatively thick and simple.

Comparison: *Turriglomina scandonei* (pl. 47, figs. 9-10) differs from *Turriglomina magna* (pl. 46, figs. 9-12; pl. 47, figs. 1-2, 8) and *T. mesotriasica* (pl. 47. figs. 3-4) in having well developed and complex initial stage, larger diameter of tubular chamber and larger size of the test.

Age: Stratigraphic distribution of the form is suggested by Rettori (1995) as Late Anisian-Ladinian. In this study, it is found in the Late Anisian-Ladinian interval.

***Turriglomina* spp.**

Pl. 47, figs 5-7.

Material: In the Laleköy member of the Camiboğazı Formation, sample no. 1212 and in the Saplazdağı member of the Camiboğazı Formation, sample no. 1303, 1350.

Description: In this study some individuals with elongate and slender consisting of undivided tubular chamber and meandrospiral or helicoidal coiling stages are attributed to the genus *Turriglomina*. Their walls is thin, simple and consist of dark-coloured microgranular calcareous material.

Age: In the study the *Turriglomina* spp. is found in Late Anisian to Ladinian.

Ophthalmidiidae WIESNER,1920

Ophthalmidiinae WIESNER,1920

Karaburunia LANGER, 1968

***Karaburunia triadica* (ex. *Sigmoilina*)** (LANGER, 1968)

Pl. 48, figs. 3, 6?.

1968 *Sigmoilina* ? *triadica* Langer, pl. 1, figs. 9-11.

Material: In the Laleköy member of the Camiboğazı Formation, sample no. 737.

Description: The test is elongate and ovate in shape. Proloculus is not distinct. Tubular undivided second chamber forms the test. Coiling is sigmoidal and probably involute. Dimension of the tubular chamber slightly increases in growth direction. Transversal section of tubular chamber is semicircular to slightly crescent. Coiling becomes looser along the long axis of the test. Wall is thick and simple. It is made up of dark-coloured microgranular calcareous material. It is thicker in the loosely coiled parts of the tubular chamber. Aperture is at the end of the tubular chamber and simple.

Remarks: In the study, it is considered that *Karaburunia* (with species *K. rendeli*) and *Sigmoilina*? (with species *S. triadica*) presented by Langer (1968, pl. 1, figs. 9-11; pl. 1, figs. 6-8, respectively) are similar to the above described forms, with respect to the shape of the test, the sigmoidal coiling and the composition of the wall.

Age: Langer (1968) reported that the *Sigmoilina*? *triadica*, is Late Anisian (Illyrian) in age, in the Karaburun Peninsula. In the study the form is found in lowermost 1-2 meter of the Laleköy member of the Camiboğazı Formation, and is Middle Anisian in age.

***Karaburunia*? sp.**

Pl. 48, figs. 1-2.

Material: In the Gerence Formation, sample no. 1115.

Description: In the transversal oblique section, test is ovate in shape. Globular proloculus is followed by undivided, coiled and tubular second chamber. Coiling is probably sigmoidal or strongly oscillated. Dimension of the tubular chamber increases in growth direction. A dark-coloured microgranular calcareous material which might be interpreted as lateral lamellae or an umbilical mass, envelopes the

tubular chamber. Wall is simple and is made up of thick, dark-coloured microgranular calcareous material.

Comparison: The form shows some similarities with genus *Karaburunia* of Langer (1968) with respect to the wall and the characteristics of coiling. However, due to the inefficiency of the material, they could not be compared properly.

Age: The *Karaburunia* ? sp. can be assigned as Early?, Middle Anisian.

Ophthalmidium KÜBLER & ZWINGLI, 1870

Ophthalmidium tricki LANGER,1968

Pl. 48. figs. 4-5, 7-9.

1968 *Praeophthalmidium (Eoophthalmidium) tricki*, Langer, pl. 1, figs. 1-5.

1969 *Praeophthalmidium (Eoophthalmidium) tricki*, Zaninetti & Brönnimann, figs. 5-6.

1974 *Cornuloculina tricki*, Efimova, pl. 4, figs. 12-13.

1976 *Ophthalmidium tricki* Zaninetti, pl. 5, figs. 17-18.

Material: In the Gerence Formation, sample no. 1115.

Description: Test is lenticular in shape. It consists of a large globular proloculus and involute, planispirally coiled, flexostyle tubular chambers. Coiling locally becomes loose. Triangular thicknesses (in equatorial view) (or septa) where the coiling becomes loose divide the tubular chambers. Number of whorls are 7-8?. Tubular chambers are semicircular in shape, in the transversal section. Their dimensions slightly increase in growth direction. Lateral extensions of the chambers completely overlap earlier whorls and form an umbilical mass in both sides of the test. Wall is calcareous or porcelaneous and recrystallized.

Comparison: *Ophthalmidium tricki* (Pl. 48, figs. 4-5, 7-9) differs from *Ophthalmidium exiguum* (Pl. 49, figs. 4, 6, 9?; pl. 50, fig. 3, 4?) in having more

number of long tubular chambers and a tighter coiling. However, dimensions of its tubular chamber are greater than those of *O. exiguum*.

Age: Langer (1968) and Zaninetti (1976), indicated that the *O. tricki* is Late Anisian (Illirian) in age. In the study the form may be assigned as Middle Anisian.

Ophthalmidium exiguum KOEHN-ZANINETTI, 1968

Pl. 49, figs. 4, 6, 9?; pl. 50, figs. 3, 4?.

1960 *Ophthalmidium* cf. *macfadyeni* Oberhauser, pl.4, figs. 31-33.

1965 *Ophthalmidium orbiculare*, Oraveczne Scheffer, pl.1, figs. 2-3.

1968 *Ophthalmidium exiguum* Koehn-Zaninetti, nomen nudum.

1969 *Ophthalmidium exiguum*, Koehn-Zaninetti, pl. 6, fig D; fig. 6.

Material: In the Gerence Formation, sample no. 1115 and in the Laleköy member of the Camiboğazı Formation, sample no. 1150 and 1185.

Description: Test is circular to ovate in shape in equatorial section. It consists of a small globular proloculus and planispirally coiled, slightly oscillating flexostyle, long, tubular chambers. Coiling locally becomes very loose. Triangular thickenings (or septa) (in equatorial view) where the coiling becomes loose divide the tubular chambers. Numbers of whorls are 7 or 8?. Dimensions of tubular chambers slightly increase in growth direction. Wall is microgranular or porcelaneous calcareous.

Comparison: *Ophthalmidium exiguum* (Pl. 49, figs. 4, 6, 9?; pl. 50, figs. 3, 4?) differs from *Ophthalmidium tricki* (Pl. 48, figs. 4-5, 7-9) in having much looser coiling and smaller dimensions of tubular chamber.

Age: Zaninetti (1976), noted that the *O. exiguum* is Ladinian- Carnian in age. In the study the form is observed in the Middle Anisian to Ladinian interval.

***Ophthalmidium* spp.**

Pl. 49, figs. 5, 7, 8.

Material: In the Laleköy member of the Camiboğazı Formation, sample no. 1147, 1151 and 1185.

Remarks: In the study, some species consisting of planispirally coiled, slightly oscillating flexostyle, and long tubular chambers are attributed to the genus *Ophthalmidium*. The tubular chambers are circular or ovate in shape, in equatorial or equatorial oblique sections. They are continuous along one and a half whorls. The coiling is very loose or strongly oscillated. The wall is microgranular or porcelaneous calcareous. Because of inefficiency of material these are named as *Ophthalmidium* spp.

Age: Individuals belonging to *Opthalmidium* spp. are observed in the Middle Anisian to Ladinian interval, in the study.

***Ophthalmidium* sp. (A)**

Pl. 50, figs. 1-2.

Material: In the Hanaylı member of the Camiboğazı Formation, sample no. 1505.

Description: Test is discoidal ovate in shape. Proloculus is not distinct. Coiled, long tubular chambers form the test. The coiling is oscillating planispiral. The lengths of the tubular chambers are up to one half whorls in the late whorls. Loose coiling give rise to a triangular shaped thickening in the opposite pole along the long axis of the test. Wall is made up of dark-coloured microgranular or porcelaneous calcareous material.

Comparison: *Opthalmidum* sp A (Pl. 50, figs. 1-2) differs from *O. tricki* (Pl. 48. figs. 4-5, 7-9), *O. exiguum* (Pl. 49, figs. 4, 6, 9?; pl. 50, figs. 3, 4?) and

Ophthalmidium spp. (Pl. 49, figs. 5, 7, 8) in having distinct discoidal ovate shape and polar triangular thickenings along the long axis of the test.

Age: *Ophthalmidium* sp. A is Norian in age in the Karaburun Peninsula.

***Ophthalmidium* sp.**

Pl. 50. fig. 5.

Material: In the Hanaylı member of the Camiboğazı Formation, sample no. 1505.

Remarks: Test is discoidal ovate in shape. Proloculus is not distinct. Coiled, long tubular chambers form the test. The coiling is nearly planispiral and strongly oscillating in early whorls. Triangular thickenings are not distinct. Wall is made up of dark-coloured microgranular or porcelaneous calcareous material. The form may be compared with *Opthalmidium* sp. A, with respect to the discoidal ovate shape of the test, however, the material is inefficient to correlate the two forms.

Age: *Ophthalmidium* sp. is Norian in age in the Karaburun Peninsula.

Paraophthalmidium SAMUEL & BORZA, 1981

***Paraophthalmidium* sp.**

Pl. 50, figs, 6-7

Material: In the Laleköy member of the Camiboğazı Formation, sample no. 1202 and in the Saplazdağı member of the Camiboğazı Formation, sample no. 1341.

Description: Test is amphora-shaped. Proloculus is not distinct. The test is formed by long tubular chambers. The chambers are half a whorl in length. Coiling is nearly planispiral, with strongly oscillating plane of coiling. Numbers of the whorls are 4, 5. Aperture is terminal and on the neck. It has a wide bordering lip. Wall is made up of porcelaneous calcareous material.

Age: The form is observed in Ladinian.

Miliolacea (EHRENBERG, 1839) emend. BRÖNNIMANN&ZANINETTI, 1971

Fischerinidae MILLET, 1898

Cyclogirinae LOEBLICH & TAPPAN, 1961

Agathammina NEUMAYR, 1887

Agathammina austroalpina KRISTAN-TOLLMANN & TOLLMAN, 1964

Pl. 50, figs. 8-9; pl. 51, figs, 2-3.

1962 *Quinqueloculina* sp. Kristan-Tollmann, pl. 2, figs. 35-40.

1964 *Agathammina austroalpina* Kristan-Tollmann & Tollmann, pl. 2, figs. 6-13; pl. 5, figs. 8-9.

Material: In the Hanaylı member of the Camiboğazı Formation samples no. 1505, 1845, and 1853.

Description: Test is small and ovate. Deuteroloculus is not distinct. Test is formed by a coiled, undivided, tubular second chamber. Coiling is nearly quinqueloculine, slightly irregular in late whorls. Transversal section of the tubular chamber is circular to subcircular, its dimensions increase in growth direction. Wall is made up of microgranular calcareous material and is simple.

Comparison: The *Agathammina austroalpina* (Pl. 50, figs. 8-9; pl. 51, figs, 2-3) differs from *Agathammina? iranica* (Pl 51, fig 19) in having less inflated chambers and regular periphery.

Age: To Zaninetti (1972) *Agathammina austroalpina* is Late Triassic in age. Salaj et al. (1967) reported the form in the Carpats in Ladinian. Gazdzicki & Zavidzka (1973) and Trifonova (1972) in the Carpats, Wernli & Brönnimann (1973) in France and Koehn-Zaninetti et al. (1969) stated the occurrence of the form in Anisian. In the study, it is found in the Norian.

Agathammina ? iranica ZANINETTI, BRÖNNIMANN, BOZORGNIA&HUBER, 1972

Pl.. 51, fig. 1.

1972 *Agathammina ?iranica* Zaninetti, Brönnimann, Bozorgnia & Huber, pl. 3, fig. 1-16.

Material: In the Saplazdağı member of the Camiboğazı Formation sample no. 1426.

Description: Test is subcircular in shape in a transversal section which is distant from the proloculus. Test form is formed by coiled, undivided, tubular second chamber. Coiling is nearly quinqueloculine. The tubular chamber is slightly inflated, its dimensions increase in growth direction. Wall is made up of microgranular calcareous material and is simple.

Comparison: *Agathammina ? iranica* (Pl 51, fig 1) differs from *Agathammina austroalpina* (Pl. 50, figs. 8-9; pl. 51, figs, 2-3) in having more inflated chambers and a irregular periphery.

Age: To Zaninetti et al. (1972, 1974) *Agathammina iranica* is Late Ladinian, Carnian? in age. In the study, it is found in Carnian.

Milioliporidae BRÖNNIMANN & ZANINETTI, in BRÖNNIMANN, ZANINETTI, BOZORGNIA, DASHTI & MOSHTAGHIAN, 1971

Galeanella KRISTAN, 1958, emend. ZANINETTI & BRÖNNIMANN, in BRÖNNIMANNCADET, RICOU & ZANINETTI, 1973

***Galeanella* ? sp.**

Pl. 51, fig. 4.

Material: In the Laleköy member of the Camiboğazı Formation, sample no. 1223.

Description: In the study, one individual which is formed by a coiled, probably tubular chamber showing some similarities to the genus *Galeanella*, such as, chamber lumen, very thick, coarsely perforate wall, however with much smaller diameter, is attributed to this genus. As a result of strong micritization, the generic properties of the individual are not distinct. Therefore the form may belong to another genus as well.

Age: The *Galeanella* ? sp. (Pl. 51, fig 4) is Ladinian in age, in the study.

SPIRILLININA HOHENNEGGER & PILLER, 1975

Spirillinidae REUSS & FRITSCH, 1861

Turrispirillina CUSHMAN, 1927

***Turrispirillina* sp.**

Pl. 51, fig. 5.

Material: In the Gerence Formation, sample no. 1115.

Description: The test is small and is a low cone in shape. Proloculus is not distinct. Tubular undivided second chamber forms the test. Coiling is trochospiral. It has a large, profound umbilicus. The wall is made up of light-coloured hyaline calcite.

Comparison: The *Turrispirillina* sp. (Pl. 51, fig. 5) differs from *T. carpatho-rumana* (Zaninetti, 1976; pl. 14, fig. 24, 25), *T. prealpina* (Zaninetti, 1976; pl. 14, fig. 26, 30), *T. minima* (Zaninetti, 1976, pl. 23, 1-3) in having lower cone-shaped test and higher cone cone-shaped test and narrower apical angle, respectively.

Age: The *Turrispirillina* sp. is Middle Anisian in age.

LAGENINA DELAGE & HÉROUARD, 1896

Duostominacea BROTZEN, 1963

Duostominidae BROTZEN, 1963

Duostominid Foram (A)

Pl. 51, figs, 6-8; pl. 52; pl. 1-2.

Material: In the Gerence Formation, sample no. 1115 and in the Laleköy member of the Camiboğazı Formation, sample no. 1192.

Description: Test is low and spreading conical in shape. Proloculus is not distinct. Trochospirally coiled subglobular chambers form the test. Dimensions of the subglobular chambers increase in growth direction. The chambers are bounded by umbilical cavity, in the inner side of the trochospire. Wall is made up of dark-coloured microgranular calcareous material.

Comparison: Doustominid foraminifer A, (Pl. 51, figs, 6-8; pl. 52; pl. 1-2), differs from Duostominid foraminifer B (Pl. 52, figs. 3, 5), C (Pl. 52, figs. 4, 6-8), D (Pl. 53, figs. 1, 3, 5, 7), E (pl. 53, figs. 2, 4) and F (Pl. 53, figs. 6, 8), in having lower and spreading conical test shape.

Age: The Duostominid foraminifer A, is found in the Middle Anisian-Late Anisian to Ladinian time interval.

Duostominid foraminifer B

Pl. 52, figs. 3, 5.

Material: In the Gerence Formation, sample no. 1115 and in the Laleköy member of the Camiboğazı Formation, 737.

Description: Test is high, large and conical in shape. Proloculus is not distinct and trochospirally coiled subglobular chambers forms the test. Sizes of subglobular chambers increase in growth direction. Wall is made up of dark-coloured microgranular calcareous material.

Comparison: Doustominid foraminifer B (Pl. 52, figs. 3, 5), differs from Duostominid foraminifer A, (Pl. 51, figs, 6-8; pl. 52; pl. 1-2), C (Pl. 52, figs. 4, 6-8), D (Pl. 53, figs. 1, 3, 5, 7), E (Pl. 53, figs. 2, 4) and F (Pl. 53, figs. 6, 8), in having a higher and larger conical-shaped test.

Age: The Duostominid foraminifer B is Middle Anisian in age.

Duostominid foraminifer (C)

Pl. 52, figs. 4, 6-8.

Material: In the Gerence Formation sample no. 1117, in the Laleköy member of the Camiboğazı Formation sample no. 1152, 1154, 1155, 1163, 1183 and 1208, and in the Saplazdağı member of the Camiboğazı Formation, sample no. 1328.

Description: Test is conical in the early, cylindrical in the later stages. Proloculus is not distinct, probably small and globular in shape (pl. 52, fig. 7). Trochospirally coiled, subglobular chambers form the test. Sizes of subglobular chambers increase in growth direction. Wall is made up of dark-coloured microgranular calcareous material.

Comparison: Doustominid foraminifer C (Pl. 52, figs. 4, 6-8), differs from Duostominid foraminifer A, (Pl. 51, figs, 6-8; pl. 52; pl. 1-2), B (Pl. 52, figs. 3, 5), D (Pl. 53, figs. 1, 3, 5, 7), E (Pl. 53, figs. 2, 4) and F (Pl. 53, figs. 6, 8) in having different test shapes in its early and late stages.

Age: The Duostominid foraminifer C, is Middle Anisian to Ladinian in age.

Duostominid foraminifer (D)

Pl. 53, figs. 1, 3, 5, 7.

Material: In the Laleköy member of the Camiboğazı Formation, sample no. 1134, 1136, 1151 and 1154; in the Saplazdağı member of the Camiboğazı Formation,

sample no. 1308 and 1390? and in the Hanaylı member of the Camiboğazı Formation, sample no. 1444 and 1455.

Description: Test is slightly high in the early, spreading conical in the late stages. Proloculus is not distinct. Trochospirally coiled subglobular chambers form the test. Sizes of subglobular chambers increase slightly in the early, rapidly in the late whorls. Wall is made up of dark-coloured microgranular calcareous material.

Comparison: Doustominid foraminifer D (Pl. 53, figs. 1, 3, 5, 7), differs from Duostominid foraminid foraminifer A, (Pl. 51, figs, 6-8; pl. 52; pl. 1-2), B (Pl. 52, figs. 3, 5), C (Pl. 52, figs. 4, 6-8), E (Pl. 53, figs. 2, 4) and F (Pl. 53, figs. 6, 8) in having different test shapes in its early and late stages.

Age: The Duostominid foraminifer D is Middle-Late Anisian to Norian in age.

Duostominid foraminifer E

Pl. 53, figs. 2, 4.

Material: In Laleköy member of the Camiboğazı Formation, sample no. 1179 and 1211.

Description: Test is sharply pointed conical in shape. Proloculus is small and globular. Trochospirally coiled subglobular chambers form the test. Sizes of subglobular chambers slightly increase in growth direction. Wall is made up of dark-coloured microgranular calcareous material.

Comparison: Doustominid foraminifer E (Pl. 53, figs. 2, 4), differs from Duostominid foraminifer A, (Pl. 51, figs, 6-8; pl. 52; pl. 1-2), B (Pl. 52, figs. 3, 5), C (Pl. 52, figs. 4, 6-8), D (Pl. 53, figs. 1, 3, 5, 7), and F (Pl. 53, figs. 6, 8) in having a sharply pointed conical test.

Age: The Duostominid foraminifer E is Middle-Late Anisian to Ladinian in age.

Duostominid foraminifer (F)

Pl. 53, figs. 6, 8.

Material: In the Hanaylı member of the Camiboğazı Formation, sample no. 1469 and 1494.

Description: Test is truncated conical in shape. Proloculus is small and globular. Trochospirally coiled subglobular chambers form the test. Sizes of subglobular chambers are very small in the first and may be small in the second whorls, later it is rapidly increases. The early whorls are strongly enveloped by the later whorls. Wall is made up of dark-coloured microgranular calcareous material.

Comparison: Doustominid foraminifer F (Pl. 53, figs. 6, 8), differs from Duostominid foraminifer A, (Pl. 51, figs, 6-8; pl. 52; pl. 1-2), B (Pl. 52, figs. 3, 5), C (Pl. 52, figs. 4, 6-8), D (pl. 53, figs. 1, 3, 5, 7) and E (Pl. 53, figs. 2, 4) in having a truncated conical test.

Age: The Duostominid foraminifer F is Norian in age.

Variostoma KRISTAN-TOLLMANN, 1960

***Variostoma* sp.**

Pl. 54, figs. 1-3.

Material: In Laleköy member of the Camiboğazı Formation, sample no. 1159, 1173, 1197 and 1209, in the Saplazdağı member of the Camiboğazı Formation, sample no. 1318 and in the Hanaylı member of the Camiboğazı Formation, sample no. 1488.

Description: Test is distinctly high conical in shape. Proloculus is small and globular. Trochospirally coiled subglobular chambers form the test. Sizes of the subglobular chambers gradually increase in growth direction. Wall is made up of dark-coloured microgranular calcareous material.

Comparison: *Variostoma* sp. (Pl. 54, figs. 1, 3), differs from Duostominid foraminifer A, (Pl. 51, figs, 6-8; pl. 52; pl. 1-2), B (Pl. 52, figs. 3, 5), C (Pl. 52, figs. 4, 6-8), D (Pl. 53, figs. 1, 3, 5, 7), E (Pl. 53, figs. 2, 4) and F (Pl. 53, figs. 6, 8) in having a very high conical test.

Age: The Variostoma sp. is Late Anisian to Norian in age.

Duostominidae BROTZEN, 1963

Pl. 54, figs. 4-9.

Material: In the Gerence Formation, sample no. 1072, 1115 and 1117; in the Laleköy member of the Camiboğazı Formation, sample no. 1138, 1152, 1154, 1162, 1161, 1163, 1172, 1175, 1182, 1185, 1191, 1192, 1193, 1194, 1197, 1208, 1210, 1202, 1211, 1212, 1217, 1228, 1250 and 1261; in the Saplazdağı member of the Camiboğazı Formation, sample no. 1268, 1282, 1298, 1301, 1318, 1321, 1324, 1349, 1384, 1389, 1405, 1426 and 1430, and in the Hanaylı member of the Camiboğazı Formation, sample no. 1444, 1471, 1469, 1503, 1497 and 1505.

Remarks: In the study, due to the difficulties in determining the genus and the species, because of various reasons, many individuals having the transversal or the tangential view of Duostominid foraminifers are grouped as Duostominidae.

Age: The individuals of Duostominidae are found in the Pre-Middle Anisian to Rhaetian time interval.

ROTALIINA DELAGE & HÉROUARD, 1896

Nodosariacea EHRENBERG, 1838

Nodosariidae EHRENBERG, 1838

Nodosariinae EHRENBERG, 1838

Nodosariid foraminifer

Pl. 55, 3-12.

Material: In the Gerence Formation, sample no. 1072, 1078 and 1115; in the Laleköy member of the Camiboğazı Formation, sample no. 1142, 1146 and 1148; and in the Hanaylı member of the Camiboğazı Formation, sample no. 1322 and 1406.

Remarks: In the study, many individuals which have rectilinear or slightly curved, elongated test shape and consist of uniserially arranged globular chambers, are grouped as Nodosariid foraminifers, because of the difficulties in determining the generic properties. Sizes of their chambers rapidly or slightly increase in growth direction. Chambers are distinctly globular or inflated. Wall is made up of light-coloured hyaline calcite.

Age: The Nodosariid foraminifer is observed in the pre-Middle Anisian to Rhaetian interval in the study area.

Austrocolomia OBERHAUSER, 1960

***Austrocolomia* sp.**

Pl. 55, 1-3.

Material: In the Laleköy member of the Camiboğazı Formation, sample no. 1159 and 1180 and in the Hanaylı member of the Camiboğazı Formation, sample no. 1455.

Description: Test is elongated, cylindrical and rectilinear in shape. It consists of uniserially arranged, distinctly low globular and almost rectangular chambers, in its longitudinal section. Wall is made up of light-coloured hyaline calcite.

Age: The form is observed in the Late Anisian to Norian time interval.

Foraminifer n. gen.

Pl. 56, figs.1-6; Pl. 57, figs. 1- 8; Pl. 58,figs. 1- 6; Pl. 59, figs. 1-7; Pl. 60, figs. 1-3, 5.

Description of the genus: Test is ovate in shape, involute, slightly oscillated, planispirally coiled, slightly biumbilical with a rounded periphery. Spire enlarges gradually in early and rapidly later whorls. Initial stage is not observed. The test is divided into several chamberlets by thick hyaline calcite septa with probable interseptal canals. Apertures are canal like in the central area of the septa and interiomarginal between the septa and the ceiling of the proceeding whorls. The wall is coarsely perforated, made up of hyaline calcite and is simple. Recrystallization occurring in the centre of the test is characteristic for the form.

Foraminifer n. gen. n. sp.

Pl. 56, figs. 1-6; pl. 57, figs. 1-8; pl 58, figs. 1-6; Pl. 59. figs. 1-8; pl. 60, figs 1-3, 5.

Material: In the Hanaylı member of the Camiboğazı Formation, sample no. 1853 and 1854.

Holotype: A slightly lateral equatorial section of the specimen is illustrated in Pl. 2, fig. 1 (Sample no. 1853).

Depository of the material: The illustrated and described specimens have been deposited in the Geology Department of the Dokuz Eylül University, in İzmir.

Holotype: The specimen illustrated in pl. 57, fig. 1 (Sample no. 1853).

Paratype: All of the other specimens illustrated in Pl. I, II, III, IV and V.

Type locality: To the 1, 5 km northwest of the Kadıovacık and 200 m west of Kırıkpınar Tepe.

Association: The form is found together with *Aulotortus communis* (pl. 59, fig. 6) in the same layers. Underlying and overlying layers include *A.* gr. *sinuosus, A. tenuis, A. praegaschei, A. friedli, Agathammina austroalpina* and *Gandinella falsofriedli.*

Description: The test is ovate in shape and slightly biumbilical with rounded periphery. Initial stage is not distinct because of the recrystallization in the centre of the test. Coiling is distinctly oscillated planispiral and involute, consisting of at least 2,5-3 whorls (Pl. 57, fig. 1, 3, pl. 56, fig. 3 and pl. 58. fig. 4). The spire enlarges gradually in the early and rapidly in the last whorls. The test is divided into several chamberlets by thick septa made up of hyaline calcite. Height and width of the chamberlets gradually increase in growth direction. The septa are slightly inclined towards the back or perpendicular to the ceiling of proceeding whorl, and probably have interseptal canals (Pl. 56, fig. 1, 2, 5; pl. 59, figs 1, 2, 4, 6). Numbers of septa are 33 and approximately 20 of them are in the last two whorls. A canal-like opening parallel to the coiling plane (Pl. 58, figs, 2-4, 6, pl. 59, figs. 5-6; pl. 57, fig. 8) may be present in the central area of the septa. Because of the recrystallization, the openings between the chamberlets are not distinct in the early whorls. In the last whorl, openings between septa and ceiling of the proceeding whorls provide passage between the chamberlets. The wall is thick, coarsely perforated and made up of light-coloured hyaline calcite (Pl. 1, figs. 4, 5; pl. 57, figs. 2, 3, 6; pl. 58, figs. 4,5-6; pl. 59, figs. 1-2, 4-7).

Type stratum: The form is observed in a bioclastic wackestone. The age of the form is Norian.

Unknown foraminifer (A)

Pl. 60, figs. 6-8.

Material: In the Gerence Formation, sample no. 1115.

Description: Test is coiled. It consists of a large globular proloculus and a coiled, undivided, tubular second chamber. Coiling is nearly glomospiral. Numbers of whorls are 3-4. Diameter of the tubular chamber rapidly increases from the beginning. Transversal section of the tube is circular to semicircular in shape. Recrystallized wall is represented by simple, thin, dark-coloured microgranular or two-layered, dark-coloured and hyaline calcareous material.

Age: The Unknown foraminifer A is found in the Middle to Late Anisian time interval, in the study.

Unknown foraminifer (B)

Pl. 60, fig. 4.

Material: In the Gerence Formation, sample no. 1129.

Description: Test is coiled and multi-chambered. The type of the coiling is not distinct. Chambers are divided by thin septa consisting of probably recristalized, light-coloured hyaline calcite.

Age: The Unknown foraminifer B is Middle to Late Anisian in age

Unknown foraminifer (C)

Pl. 61, figs. 1, 3.

Material: In the Laleköy member of the Camiboğazı Formation, sample no. 1192 and in the Saplazdağı member of the Camiboğazı Formation, sample no. 1283.

Remarks: Test is subspherical to conical in shape. Its generic properties are not distinct. It may be formed by uniserially arranged low globular chambers or by a trochospirally coiled tubular chambers. Its other surface covered by microgranular projections or pillar-like spines as it is present in *Hirsitospirella* (Zaninetti et al., 1985). The wall is thick and is made up of agglutinated to microgranular calcareous material.

Age: The Unknown foraminifer C is found in Ladinian.

Unknown foraminifer (D)

Pl. 61, figs. 2, 4-8.

Material: In the Laleköy member of the Camiboğazı Formation, sample no. 1137; in the Saplazdağı member of the Camiboğazı Formation, sample no. 1281,

1377 and 1379; and in the Hanaylı member of the Camiboğazı Formation, sample no. 1461.

Remarks: Test is ovate in shape and coiled. The coiling is oscillating planispiral and involute in early whorls, later the coiling plane may change and may become slightly trochospiral. It is formed by a tubular undivided second chamber which is rapidly enlarging in growth direction. As a result of strong recrystallization, it is not clear if the thickness of wall is greater than the inner diameter of tubular chamber as it is in the genus *Galaenella*. In pl. 61, figs 5-6 and 8, there are small openings which might belong to tubular chamber or might be umbilical cavity formed by trochospiral coiling. The wall seems to be very thin porcelaneous calcite. In this study, it is considered that this form should be compared with genus *Galaenella* and relative taxa.

Age: The Unknown foraminifer D is found in the Middle-Late Anisian to Norian time interval.

6.2. JURASSIC

JURASSIC TAXONOMI

TEXTULARIINA

LItuolacea DE BLAİNVİLLE, 1827

Nautiloculinidae LOEBLİCH & TAPPAN, 1985

Nautiloculina MOHLER, 1938

***Nautiloculina* sp.**

Pl. 62, fig. 1.

Material: In the Birgi Formation, sample no. 133.

Description: Test is lenticular in shape and coiled. Coiling is planispiral and involute. Proloculus is not distinct. The test comprises numerous chambers which are

increasing in size, in growth direction. Septa are radial and thin. Wall is made up of dark-coloured microgranular calcareous material.

Age: The *Nautiloculina* sp. is Kimmeridgian in age in the study.

Mayncinidae LOEBLICH & TAPPAN, 1965

Mayncina NEUMANN, 1965

Mayncina termieri HOTTINGER, 1967

Pl. 61, figs. 2-4, 6.

1967 Mayncina termieri Hottinger, pl. 3, figs.4-10, fig. 14 in texte.

Material: In the Lower limestone subunit of the Nohutalan Formation, sample no. 34, 40, 41, 49, 50, 55, 62, 64, 67, 68, 78, 79, 82, 83, 84, 86, 96, 100, 101, 107, 110, 111, 113 and 114.

Description: Test is elongated cylindrical in shape and consists of two stages. The first stage consists of a globular proloculus and planispirally coiled, subspherical chambers gradually increasing in size, in growth direction. Numbers of whorls are 1 to 2, in the first stage. The second stage is rectilinear and uniserial. It is made up of very low cylindrical chambers. The chambers are separated by thick septa. Apertures are cribrate, with pores on the last chamber and are reflected in longitudinal section by multiple passages on the septa. Wall is made up of dark-coloured microgranular calcareous material.

Age: The *Mayncina termieri* is Early to Middle Liassic in age, in the study.

Biocovinacea GUSİC, 1977

Biocovinidae GUSİC, 1977

Bosniella GUSİC, 1977

***Bosniella*? sp.**

Pl. 62, fig. 5

Material: In the Upper Limestone subunit of the Nohutalan Formation, sample no. 89.

Description: Test is multi-chambered. It is planispirally coiled in the early stage and may be uncoiled later. The circular-shaped chambers are separated by thick septa. Embryonic stage is not distinct. Thick wall probably consists of two layers; the outer layer is microgranular and the inner layer is keriothecal in composition.

Age: Gusic (1977) reported that the form is Middle Liassic in age in the Bosnia. In the study it is also found in the Middle Liassic.

Cyclolinacea LOEBLICH & TAPPAN, 1964

Orbitopsellidae HOTTINGER & CAUS, 1982

Labyrinthina WEYNSCHENK, 1951

Labyrinthina* cf. *recoarensis

Pl. 62, figs, 7, 8.

1959 *Lituosepta recoarensis* Cati, pl. 1.

1967 *Labyrinthina recoarensis*, Hottinger, pl. 4, figs. 14-16; pl. 8, figs. 27-29; figs. 15-16 in texte.

Material: In the Upper limestone subunit of the Nohutalan Formation, sample no. 72.

Description: Test is elongated cylindrical in shape. It consists of two stages. The first stage is planispirally coiled and involute. It consists of a globular proloculus and subspherical chamber. Numbers of whorls are 1.5-2. Second stage is rectilinear and uncoiled. It consists of uniserially arranged, compressed to peneropliform chambers. Chamber lumen is occupied by endoskeletal pillars extending from the chamber floor

to the ceiling. In each chamber, internal exoskeletal beams extend from septum to septum. Wall is simple and imperforate. It is made up of microgranular carbonate material.

Comparison: The form shows some similarities with *L. recoarensis* presented by Hottinger (1967) with respect to the characteristics of coiled stage and dimensions of the test. However its rectilinear stage differs from individuals of the study in having inflated central part, in the uncoiled stage. Although the form is similar to *L. recoarensis*, it may belong to another species or be a new one.

Age: To Hottinger (1967) noted that the *Lituosepta recoarensis* is late Early Liassic to early Late Liassic in age. Bassoulet (1996) recorded the stratigraphic distribution of the form as Sinemurian. In the study the form is also found in Middle Liassic.

***Labyrinthina* sp.**

Pl. 62, figs. 9-12

Material: In the Upper limestone subunit of the Nohutalan Formation, sample no. 58, 70, 72 and 77.

Description: Test is elongated cylindrical in shape. The first stage is not distinct. Second stage is rectilinear and uncoiled. It consists of uniserially arranged compressed to peneropliform chambers. Chamber lumen is occupied by endoskeletal pillars extending from the chamber floor to the roof. Wall is simple and imperforate. It is made up of microgranular carbonate material. In each chamber, internal exoskeletal beams extend from septum to septum.

Age: In the study the *Labyrinthina* sp. is found in Middle Liassic.

Orbitopsella MUNIER-CHALMAS, 1902

Orbitopsella primaeva (HENSON, 1948) HOTTINGER, 1967

Pl. 63, figs. 1-2.

1948 *Coskinolinopsis primaevus* Henson, pl. 10, figs. 4-5.

1967 *Orbitopsella primaeva* Hottinger, p. 46, fig. 23, pl. 4, figs. 17-18.

Material: In the Upper limestone subunit of the Nohutalan Formation, sample no. 68 and 95.

Description: Macrospheric individuals are fan-shaped in the equatorial section, and cylindrical in axial section. Embryonic apparatus is relatively small, complex and spherical. Boundary of the protoconch is not distinct within the spheroconch. Diameter of the spheroconch is 200- 280 micron. The spheroconch is enveloped by a peneropliform nepionic stage. The nepionic stage is followed by reniform growth stage. Last annular growth stage is not observed in the study. Nepionic stage consists of peneropliform coiled very low chambers. Wall is thick and agglutinated, consisting of an exoskeletal layer and a row of short beams aligned from chamber to chamber, forming a finely alveolar network.

Comparison: *O. primaeva* (pl. 63, figs. 1-2) differs from *O. preacursor* (Pl. 63. figs. 4-5) in having reduced diameter of spheroconch. It is more evoluted than the *O.* aff. *primaeva* (Pl. 63. figs. 3, 6).

Age: To Hottinger (1967) *O. primaeva* is Middle Liassic (Pliensbachian-Domerian) in age. Bassoulet (1996) summarized the stratigraphic distribution of the form as Early Pliensbachian (Carexian) and he emphasized that the appearance and disappearance of *O. primaeva* is before of that of *O. praecursor*. However, in the study both *O. primaeva* and *O. praecursor* are found together. Therefore a Middle Liassic (Pliensbachian) age is suggested for the form.

Orbitopsella* aff. *primaeva (HENSON, 1948) HOTTINGER, 1967

Pl. 63. figs. 3, 6.

1948 *Coskinolinopsis primaevus* Henson, pl. 10, figs. 4-5.

1967 *Orbitopsella primaeva* Hottinger, p. 46, fig. 23, pl. 4, figs. 17-18.

Material: In the Upper limestone subunit of the Nohutalan Formation, sample no. 78.

Description: Macrospherical individuals are cylindrical in shape in the axial section. Embryonic apparatus is distinctly small and spherical. Boundary of protoconch is not distinct within the spheroconch. The spheroconch is enveloped by a peneropliform nepionic stage which envelops the spheroconch in axial view (pl. 63, fig. 6). The nepionic stage is followed by reniform or annular growth stage which is not distinct due to the section orientation. The low chambers which form the uncoiled stage are wide in the central part of the test and they abruptly become narrower in last 3-4 chambers. Chamber lumens are occupied by endoskeletal pillar extending from distal side of septa to proximal side of preceding septa. Wall is thick and agglutinated. As a result of recrystallization, exoskeletal layer and short beam rows are not distinct.

Comparison: *O.* aff. *primaeva* (Pl. 63. figs. 3, 6) differs from *O. preacursor* (Pl. 63. figs. 4-5) and *O. primaeva* (Pl. 63, figs. 1-2) in having smaller diameter of spheroconch and dimension of the test.

Age: The *O.* aff. *primaeva* is Middle Liassic in age, in the study.

Orbitopsella praecursor (GUMBEL, 1872) MUNIER-CHALMAS, 1902

Pl. 63. figs. 4-5.

1872 *Orbitulites praecursor* Gümbel, pl. 7, figs. 1-10.

1902 *Orbitopsella praecursor* Munier-Chalmas, p. 351.

1967 *Orbitopsella praecursor*, Hottinger, pl. 5, figs. 1-12; fig. 20 in text.

Material: In the Upper limestone subunit of the Nohutalan Formation, sample no. 68 and 110.

Description: Macrospheric individuals are fan-shaped in the equatorial section, and cylindrical in axial section. Embryonic apparatus is relatively large, complex and spherical. Globular protoconch is followed by spheroconch consisting of a few small chambers. Diameter of the spheroconch is 360-465 micron. The spheroconch is enveloped by a peneropliform nepionic stage. The nepionic stage is followed by reniform and annular growth stages which are not distinct in axial oblique views of the presented individuals. Nepionic stage consists of peneropliform, very low chambers. Uniserially arranged reniform or annular chambers are also low. Their chambers lumens are occupied by endoskeletal pillars aligned from chamber to chamber. Wall is thick and agglutinated, consisting of an exoskeletal layer and a row of short beams aligned from chamber to chamber, forming a finely alveolar network.

Probable microspheric individuals are very large. Last stage of the test consists of strongly annular uniserial chambers.

Comparison: *O. preacursor* (pl. 63. figs. 4-5) differs from *O. primaeva* (pl. 63, figs. 1-2) in having large spheroconch. It is more evoluted comparing with *O.* aff. *primaeva* (pl. 63. figs. 3, 6).

Age: To Hottinger (1967) *O. praecursor* is middle Middle Liassic in age. Bassoulet (1996) summarized the stratigraphic distribution of the form as latest Early Pliensbachian (Late Carexian) and he emphasized that the *O. praecursor* appears after disappearance of the *O. primaeva*. However in the study both *O. praecursor* and *O. primaeva* are found together. Therefore a Middle Liassic (Pliensbachian) age is suggested for the form.

***Orbitopsella* sp.**

Pl. 63, figs. 7-9.

Material: In the upper limestone subunit of the Nohutalan formation, sample no. 95, 105, 110, 114 and 115.

Remarks: In the study many individuals represented by large reniform to annular shape are attributed to the microspheric generations of genus *Orbitopsella*. They consist of uniserially arranged annular low chambers. Chamber lumens are occupied by endoskeletal pillars aligned from chamber to chamber. Their wall is thick and agglutinated, consisting of an exoskeletal layer and a row of short beams aligned from chamber to chamber, forming a finely alveolar network. .

Age: The *Orbitopsella* sp. is found in the Middle Liassic in the study.

Loftusiacea BRADY, 1884

Mesoendothyridae VOLOSHİNOVA, 1958

Mesoendothyra DAİN, 1958

Mesoendothyra croatica ? GUSIC, 1969

Pl. 64. fig. 1.

1963 *Endothyra* sp. Canovic, pl.5, fig. 2.

1966 *Endothyra* sp. *radoicic*, pl. 95, fig. 2; pl. 96, fig. 1; pl. 112, fig. 2.

1969 *Mesoendothyra croatica* Gusic, pl. 11, figs. 1-8, pl. 12, figs. 1-2.

Material: In the Birgi Formation, sample no. 152, 222, 226, 238, 261, 270, 271, 272 and 280.

Description: Test is enrolled and multi-chambered. It consists of involute, early streptospiral and later nearly planispiral stages. Coiled chambers are subspherical in shape. They are gradually increasing in size in growth direction and separated by single layered septa. Wall is made up of calcareous, imperforate microgranular outer layer and alveolar inner layer. As a result of strong recrystallization, alveolar texture of the inner layer of the wall is badly preserved.

Age: Gusic (197) stated that the *Mesoendothyra croatica* is Early Dogger in age. Bassoulet (1996) emphasized that the form is also found in Early Jurassic to Earliest Late Jurassic. He also noted that its stratigraphic distribution is not distinct. However, in the study, the form is found in Kimmeridgian time.

Cyclamminidae MARİE, 1941

Choffatellinae MAYNC, 1958

Amijiella LOEBLİCH & TAPPAN, 1985

Amijiella amiji LOEBLICH & TAPPAN, 1985

Pl. 64, figs. 2-3, 5-6.

1948 *Haurania amiji* Henson, pl. 15, figs. 5-10.

1985 *Amijiella amiji* Loeblich & Tappan, (not figured)

Material: In the Upper limestone subunit of the Nohutalan Formation, sample no. 50, 89, 119, 121 and 807.

Description: Test is elongated and subcylindrical in shape. Proloculus and early planispiral stage are not distinct. Second stage is rectilinear and it is formed by uniserially arranged low chambers. Chamber lumen is devoid of endoskelatal pillars. Wall is made up of calcareous, microgranular imperforate outer layer and exoskeleton of elongate radial beams extending into the chamber cavity.

Age: To Henson (1947) the age of the form is Jurassic or Triassic. Loeblich & Tappan (1988) summarized the stratigraphic distribution of the form as Lower Jurassic (Pliensbachian) to Middle Jurassic (Bathonian). Bassoulet (1996) emphasized that the form is latest Sinemurian (Middle Liassic) to Bathonian (early Late Dogger) in age. In the study, it is found in Middle Liassic.

Pseudocyclammina YABE & HANZAWA, 1926

Pseudocyclammina liasica HOTTINGER, 1967

Pl. 64. fig. 4.

1959 Pseudocyclammina sp. Maync, pl. 23, fig. 13.

1967 *Pseudocyclammina liasica* Hottinger, pl. 10, figs. 1-9, fig. 29: i-v (in text)

Material: In the upper limestone subunit of the Nohutalan Formation, sample no. 124.

Description: Multi-chambered test consists of an early planispiral and later uncoiled stages. Chambers are subspherical in shape and increasing in size, in the coiled stage. Numbers of whorls are 2.5-3. Uncoiled stage is formed by uniserially arranged, low chambers, slightly inflated towards the following one. Wall is made up of coarsely agglutinated calcareous material with coarse subepidermal network. The exoskeleton is represented by a few irregular pillars and the endoskeleton consists of thick and massive septa perforated by large openings.

Age: To Hottinger (1947) *Pseudocyclammina liasica* is Middle Liassic in age. Basoullet (1996) raported that the form is latest Middle Liassic to Late Liassic in age. The form is found in the Middle Liassic in the study, as well.

***Pseudocyclammina* sp. (1)**

Pl. 64. fig. 9.

Material: In the upper limestone subunit of the Nohutalan Formation, sample no. 124.

Description: Multi-chambered test consists of an early planispiral and later uncoiled stages. Chambers are subspherical in shape and increasing in size, in the coiled stage. Numbers of whorls are 2.5-3. Uncoiled stage is formed by uniserially arranged, low chambers, slightly inflated towards the following one. Wall is made up of coarsely agglutinated calcareous material with coarse subepidermal network, exoskeleton is represented by a few irregular pillars. Endoskeleton consists of thick and massive septa perforated by large openings.

Age: The form is found in the Middle Liassic in the study.

Pseudocyclammina **sp. (2)**

Pl. 64. figs. 7-8.

Material: In the Birgi Formation, sample no. 232 and 268.

Remarks: The tangential sections of the early planispiral stage and the rectilinear, uncoiled stage consisting of uniserially arranged large, semispherical, inflated chambers of individual are presented. Coiled stage is not distinct. Uncoiled chambers are separated by thick septa. Wall is made up of coarsely agglutinated calcareous material with coarse subepidermal network. The exoskeleton is represented by a few irregular pillars and the endoskeleton consists of thick and massive septa perforated by large openings. Because of inefficiency of the material, the form is named in genus rank.

Age: The *Pseudocyclammina* sp. is in Kimmeridgian in age in the study.

Spirocyclinidae MUNIER – CHALMAS, 1887

Haurania HENSON, 1948

Haurania* cf. *deserta HENSON, 1948

Pl. 65, figs. 1-2, 4.

1948 *Haurania deserta* Henson, pl. 12, figs. 1-4.

1964 *Rhapydionina desetta*, loeblich & Tappan, fig. 379 (4-69.

1967 *Haurania deserta*, Hottinger, pl. 8, figs. 7-17.

Material: In the upper limestone subunit of the Nohutalan Formation, sample no. 806 and 809.

Remarks: The individuals presented in the study are transversal oblique to longitudinal oblique views of the uncoiled uniserial stage of the form. Uniserial stage consists of low chambers. Wall is finely agglutinated calcareous with imperforate epidermis. Inner margin of the chambers are occupied by exoskeletal septula or

beams (Pl. 65, fig. 1) and by rafters that are parallel to the septa. These beams and rafter give rise to a coarsely alveolar network. The alveolar network which occurs in the specimens presented in pl. 65, fig. 1 and 2 may be interpreted as exoskeletal alveolar network of *Haurania deserta*. Chamber lumen is occupied by endoskeletal pillar (Pl 65, fig. 1). Above mentioned observation allows to attribute the form to Haurania *deserta* with cf.

Age: To Henson (1948) *H. deserta* is Jurassic or Triassic in age. To Gussic (1969), it is Middle Liassic in age. Stratigraphic distribution of the form is summarized by Bassoulet (1996) as Sinemurian (Middle Liassic) to Bathonian early Late Dogger. In the study *H.* cf. *deserta* is found in Middle Liassic.

Limognella PALISSIÉ & PEYBERNÈS, 1982

***Limognella* sp.**

Pl.. 65, fig. 5.

Material: In the Birgi Formation, sample no. 268.

Description: Test is conical to cylindrical in shape. Coiled early stage is not distinct, however its existence is clear. Second stage is uniserial and consists of subglobular chambers inflating towards the fallowing one. Wall is microgranular calcareous, coarsely agglutinated and includes very coarse calcareous grains. It probably consists of imperforate epidermis and exoskeleton formed by beams and rafters. Chambers are separated by thick septa made up of coarse calcareous grains. Because of strong recrystallization, inner structure of septa is not distinct.

Comparison: The form differs from *Limognella dufaurei* of Pelissie & Peybernes (1982) and *Spiraloconulus giganteus* of Sherchi & Schroeder (1981) in having a less developed second stage and distinctly empty chamber lumens.

Age: The form is found in the Kimmeridgian, in the study.

Trochamminacea SCHWAGER, 1877

Trochamminidae SCHWAGER, 1877

Trochammininae SCHWAGER, 1877

Trochammina PARKER & JONES, 1859

***Trochammina* sp.**

Pl. 65, fig. 3.

Material: In the Upper limestone subunit of the Nohutalan Formation, sample no. 14.

Description: Test is conical in shape. It consists of trochospirally arranged subspherical chambers. The sizes of chambers increase in growth direction. Umbilical cavity is large and profound. The wall is made up of microgranular calcareous material and is simple.

Age: The form is found in the Early Liassic?, in the study.

Ataxophragmiacea SCHWAGER, 1877

Pfenderinidae SMOUT & SUGDEN, 1962

Pfenderininae SMOUT & SUGDEN, 1962

Pfenderina HENSON, 1948

Pfenderina* cf. *trochoidea SMOUT & SUGDEN, 1962

Pl. 65, 6, 8-9, 11?, 12.

1962 *Pfenderina trochoidea* Smout & Sugden, fig. 1: E-H (in text); pl. 73, figs. 8-15, 21, pl. 74, figs. 4-6; pl. 75, figs. 1-6.

Material: In the Birgi Formation, sample no. 191, 194 and 198.

Description: Test is multi-chambered and trochospirally coiled. In the transversal oblique section, trochospire is distinctly low and expanded. The chambers surround the axial region of the thickened shell material by coiling. The chambers are

separated by thick septa made up of microgranular calcareous material. Septa are oblique to test axis. Wall is made up of microgranular calcareous material. Secondary intercameral foramina (Pl. 65, fig. 9) occur in the central solid column as a spiral groove.

Comparison: *Pfenderina* cf. *trochoidea* (Pl. 65, 6, 8-9, 11?, 12) differs from *Pfenderina* sp. 1 (Pl. 65, figs. 7?, 10) and 2 (Pl. 66, figs. 1-4) in having a lower and expanded trochospire.

Age: To Smout & Sugden (1962) *P. trochoidea* is Middle Jurassic (Bathonian) to Upper Jurassic (Oxfordian) in age. Gusic (1969) noted a Dogger to Lowermost Malm age for the form. The form is found in the lowermost part of Kimmeridgian aged Birgi Formation.

***Pfenderina* sp. (1)**

Pl. 65, figs. 7?, 10.

Material: In the Birgi Formation, sample no. 128 and 129.

Description: Test is multi-chambered and trochospirally coiled. In the longitudinal section, trochospire is distinctly large and high, comprising 8 whorls. Chambers are separated by thick septa made up of microgranular calcareous material. Septa are oblique to the test axis. The wall is made up of microgranular calcareous material.

Comparison: *Pfenderina* sp. 1 (pl. 65, figs. 7?, 10) differs from *Pfenderina* cf. *trochoidea* (pl. 65, 6, 8-9, 11?, 12) and *Pfenderina* sp. 2 (pl. 66, figs. 1-4) in having a larger and higher trochospire.

Age: The form is found in Kimmeridgian aged Birgi Formation, in the study..

***Pfenderina* sp. (2)**

Pl. 66, figs. 1-4.

Material: In the Birgi Formation, sample no. 189, 192, 196 and 226.

Description: Test is multi-chambered and trochospirally coiled. In the longitudinal section, trochospire is high. The surface is irregular. The chambers surround the axial region of the thickened shell material by coiling. The chambers are separated by thick septa made up of microgranular calcareous material. Septa are oblique to coiling axis_of the test. Wall is made up of microgranular calcareous material. Secondary intercameral foramina (pl. 66, figs. 2 and 4) occur in the central solid column as a spiral groove.

Comparison: *Pfenderina* sp. 2 (Pl. 66, figs. 1-4) differs from *Pfenderina* sp. 1 (Pl. 65, figs. 7?, 10) in having a lower trochospire. It can also be differentiated from *Pfenderina* cf. *trochoidea* (Pl. 65, 6, 8-9, 11?, 12) in having higher trochospire.

Age: The form is found in the lowermost part of Kimmeridgian aged Birgi Formation, in the study area.

Pseudopfenderinae SEPTFONTEN, 1988

"Siphovalvulina" SEPTFONTEN, 1988

***"Siphovalvulina"* sp.**

Pl. 66, figs. 5-7.

Material: In the Birgi Formation, sample no. 84 and 809.

Descriptions: Test is trochospirally coiled. It consists of triserially arranged subglobular chambers which are increasing in size, in growth direction. Wall is made up of microgranular calcareous material and it may present a keriothecal structure (Pl. 66, figs 6?-7?). Twisted siphonal canal connecting successive apertures occurs along the axis of test.

Remarks: "*Siphovalvulina*" sp. is similar to *Siphovalvulina variabilis* described by Septfontain (1988) by referring to Septfontain 1980, pl. 2, fig. 10.

Kurnubiinae REDMOND, 1964

Conicokurnubia SEPTFONTAINE, 1988

Conicokurnubia **cf.** ***orbitoliniformis*** SEPTFONTAINE, 1988

Pl. 66, fig. 8.

1988 *Conicokurnubia orbitoliniformis* n. sp. Septfontaine, pl. 2, fig. 13.

Material: In the Birgi Formation, sample no. 189.

Description: Test is conical in shape. It consists of uniserially arranged discoidal chambers. Embryonic chambers and early stage are not distinct. Wall is calcareous, microgranular with a complicated hypodermic network. Chamber lumens are occupied by pillars and probably first order vertical partition in the central area. Because of strong recrystallization, marginal sides of the chambers and second order partitions are not distinct.

Comparison: The form is similar to *Conicokurnubia orbitoliniformis* described by Septfonten (1988, pl. 2, fig. 13) in respect to conical test shape and central chamber partition. However, the presented individual (Pl. 66, fig. 8) is recrystallized and sufficient comparison is not possible.

Age: To Ducret (1979) and Septfonten (1988) *Conicokurnubia orbitoliniformis* is Oxfordian? to Kimmeridgian, in age. In the study the form is found in the Kimmeridgian time interval.

Orbitolinacea MARTİN, 1890

Orbitolinidae MARTİN, 1980

Dictyoconinae MOULLADE, 1965

Kilianina PFENDER, 1933

Kilianina rohonensis FOURY & VINCENT, 1966

Pl. 67, figs. 1-2.

1966 *Kilianina rohonensis* Foury & Vincent, pl. 2, figs. 1-14.

Material: In the Birgi Formation, sample no. 133 and 216.

Description: Test is pointed conical in shape. Proloculus and early trochospiral stage are not distinct. Second stage is rectilinear. It consists of uniserially arranged low circular chambers. Outer parts of chambers are subdivided into numerous chamberlets. Successive rows of chamberlets alternate in position. The chamberlets are differentiated by septal lames bifurcating towards the inner part of the test. Interseptal endoskeletal pillars or buttresses fill the central lumens of the chambers and form an alveolar axis. Wall is made up of imperforate calcareous microgranular material. Because of strong recrystallization, its trilamellar structure is not distinct. Communication between the chambers is provided by several interpillar openings in the central alveolar region and by intercameral foramina which provides oblique communication between successive chamberlets, in the outer part of the test. Intercameral foramina lie in a lateral position between the chamberlets.

Comparison: The *Kilianina rohonensis* (Pl. 67, figs. 1-2. differs from *K.* cf. *lata* (Pl. 67, figs. 4-6), and *K. uzunkuyuiana* n. sp. (Pl. 67, figs. 1-10; pl. 68, figs. 1-2) in having pointed and regular conical shape.

Age: To Foury & Vincent (1966) *Kilianina rohonensis* is Late Oxfordian-Early Kimmeridgian in age. Bassoulet (1996) summarized the age of the *Neokilianina rohonensis* as Kimmeridgian. In the study it is also Kimmeridgian in age.

***Kilianina* cf. lata** OBERHAUSER, 1956

Pl. 67, figs. 4-6

1956 *Kilianina lata* Oberhauser, pl.1, figs. 1-3, 5-6; figs. 1, 2 (in text).

Material: In the Birgi Formation, sample no. 259.

Description: Test is expanded conic in shape. Proloculus and early trochospiral stage which are characteristic for the genus Kilianina, are not distinct. The cone of

second stage is pointed and narrow in the first half. It is distinctly low and expanded in the second half. Last chambers of second part may be curved towards the dorsal side (Pl. 67, fig. 6). Ventral side is distinctly concave. The second stage is rectilinear. It consists of uniserially arranged low circular chambers. Outer parts of the chambers are subdivided into numerous chamberlets. Successive rows of chamberlets alternate in position. The chamberlets are differentiated by septal lames bifurcating towards the inner part of the test (Pl. 67, fig. 4). The chamberlets of the outer part are slightly inflated towards the exterior and basal side of the test. Interseptal endoskeletal pillar or buttresses fill the central lumens of the chambers and form an alveolar axis. Wall is made up of imperforate calcareous microgranular material. Because of strong recrystallization, trilamellar structure which is characteristic for the genus is not distinct. Communication between chambers is provided by several interpillar openings in the central alveolar region and by intercameral foramina which allows oblique communication between successive chamberlets, in the outer part of the test. Intercameral foramina lie in a lateral position between the chamberlets.

Comparison: The *Kilianina* cf. *lata* (Pl. 67, figs. 4-6) differs from *K. rohonensis* (Pl. 67, figs. 1-2, and *K. uzunkuyuiana* n. sp. (Pl. 67, figs. 1-10; pl. 68, figs. 1-2) in having an early pointed and high and a late expanded low conical shape.

Age: To Oberhauser (1956) the age of the *Kilianina lata* is Malm in age in the Taurids, Turkey. In the study it is Kimmeridgian in age.

***Kilianina uzunkuyuiana* n.sp.**

Pl. 67, figs. 1-10; pl. 68, figs. 1-2.

Material: In the Birgi Formation, sample no. 139, 140, 148, 149, 199, 203, 241, 262, 265, 267 and 270.

Origine of the name: The form was found at the vicinity of the Uzunkuyu village. The name of the form is attributed to the Uzunkuyu village and its hospitable people.

Holotype: An axial section presented in pl. 68, fig. 1.

Paratypes: Axial sections of individuals are illustrated in pl. 68, fig. 5, 3.

Type-locality: To the north of the Uzunkuyu and Birgi villages, on the Örendağı sırtı.

Diagnosis: Test conic, ventral side concave, the cone enlarging gradually up to last 3-4 chambers and rapidly in last 3-4 chambers. Uniserially arranged chambers divided into numerous chamberlets, differentiated by marginal pillars and septal lames bifurcating and fluting towards interior forming losange-like chamberlets. Succeeding chamberlets alternate in position. Central lumens of chambers occupied by conical pillars, alternating in position and extending from base to preceding chamber. Communication oblique and lateral interpillar both in the central and marginal region.

Description: Test is conic in shape. Ventral side of the test is concave. Proloculus and early trochospiral stage which are characteristic of genus Kilianina, are not distinct. The second stage is rectilinear. It consists of uniserially arranged low circular chambers. The chambers which form the cone, gradually enlarges up to last 3-4 chambers. The last 3-4 chambers enlarge rapidly and beginning from the last 3-4 chamber, the test becomes concave. Outer parts of chambers are subdivided into numerous chamberlets. The chamberlets are differentiated by marginal pillar and septal lames. Successive marginal pillars alternate in position as in *K. blanchetiformis* (Taslı, 2000). The septal lames are bifourcating and fluting towards the inner part of the test (Pl. 68, fig. 4) and give rise losangic chamberlets. Successive rows of chamberlets also alternate in position. Interseptal endoskeletal conical pillars which are alternating in position with those of preceding and fallowing chambers fill the central lumens of the chambers and form an alveolar axis (pl. 68, fig.2, 8, 10). Wall is made up of imperforate calcareous microgranular material. Because of strong recrystallization, trilamellar structure which is characteristic for the genus is not distinct. Communication between the chambers is provided by several interpillar openings in the central alveolar region and by intercameral foramina allowing oblique communication between successive

chamberlets, in the outer part of the test. Intercameral foramina lie in a lateral position between the chamberlets.

Comparison: The *Kilianina uzunkuyuiana* n. sp. (Pl. 67, figs. 1-10; pl. 68, figs. 1-2) differs from *K. rohonensis* (Pl. 67, figs. 1-2, and *K.* cf. *lata* (Pl. 67, figs. 4-6) in having slightly biconcave, relatively low and slightly enlarging conical shape in the last 3-4 chambers.

Type level: The *Kilianina uzunkuyuiana* is found in the Kimmeridgian.

***Kilianina* sp.**

Pl. 67. figs. 8-11.

Material: In the Birgi Formation, sample no. 213, 235, 252 and 256.

Remarks: In the study some individuals which belong to genus Kilianina are named as Kilianina sp. Some of them may be compared with *K.* cf. *lata* (Pl. 67, figs. 6, 11). However, because of inefficiency of fossil material, they are determined in genus rank.

Age: The *Kilianina* sp. is found in Kimmeridgian, in the study.

Textulariicea EHRENBERG, 1838

Valvulinidae BERTHELİN, 1880

Chrysalidinidae NEAGU, 1968

Parurgonina CUVİLLİER, FOURY & PİGNATTİ MORANO, 1968

Parurgonina caelinensis (CUVİLLİER, FOURY & PİGNATTİ MORANO, 1968) HOTTINGER, 1970

Pl. 69, figs. 3-10; pl. 70, figs. 1-2, 4.

1962 *Coskinolina* Calet, pl.18, fig. 2.

1962 *Coskinolina* sp., Calet, pl. 18, fig. 3.

1968 *Urgonina (Parurgonina) caelinensis*, Cuvillier, Foury & Pignatti-Moreno, pl. 2, figs. 1-12; pl. 3, figs. 1-9.

1969 *Lituonella dinarica*, Gusic, pl. 13, figs. 1-2; pl. 14, figs. 1, 4.

1971 *Parurgonina caelinensis* Hottinger, pl. 1, fig. 29.

Material: In the Birgi Formation, sample no. 126, 127, 170, 197, 217, 219, 252, 262, and 267.

Description: Test is high conical in shape and consists of two stages. Proloculus and adjacent deuteroloculus (Pl. 69, fig. 3; pl. 70, figs. 1, 2) are spherical and located at the point of the cone. The first stage (Pl. 69, fig. 3; pl. 70, figs. 1, 2) consists of probably trochospirally enrolled subglobular chambers. Numbers of whorls in the first stage are 4- 5. A columella-like thickening occurs along the axis of trochospire. A zigzag shaped canal is present along the axis of the columella-like thickening. Communication between the chambers of the first stage and zigzag canal is provided by tubular openings (Pl. 70, fig. 2). Second stage is rectilinear consisting of uniserially arranged discoidal chambers. Discoidal chambers are divided into numerous chamberlets by "septal lames" and "marginal pillars" in the marginal side. Septal lames are interpreted as "lames helicoidales" by Cuvillier et al. (1968) and as a trochospiral arrangement of marginal chamberlets by Septfonten (1988). Successive chamberlets are alternating in position. Chamber lumens of the uniserial chambers are occupied by subconical to conical-shaped pillars which extend from the chamber floor to the roof. Communication is provided by interpillar oblique openings in the central and marginal regions. Wall is thick and keriothecal, consisting of calcareous material.

Discussion: The zigzag shaped channel and tubular openings of the first stage are described for the first time in this study. However these observations depend only on one individual. Therefore it is considered that further study on different individuals is required for clarifying the structure of first stage.

Comparison: The *Parurgonina caelinensis* (Pl. 69, figs. 3-10; pl. 70, figs. 1-2, 4) differs from the *Parurgonina* cf. *caelinensis* (Pl. 70, figs. 3, 5-7) in having more conical shape and smaller chamber height.

Age: To Cuvillier et al. (1968) the form is the Kimmeridgian to Portlandian in age. Stratigraphic distribution of *Parurgonina caelinensis* is summarized by Bassoulet (1996) as Kimmeridgian and probably early Early Tithonian.

Parurgonina* cf. *caelinensis (CUVILLIER, FOURY & PIGNATTI MORENO, 1968) HOTTINGER, 1970

Pl. 70, figs. 3, 5-7.

1962 *Coskinolina* Calet, pl.18, fig. 2.

1962 *Coskinolina* sp., Calet, pl. 18, fig. 3.

1968 *Urgonina* (*Parurgonina*) *caelinensis*, Cuvillier, Foury & Pignatti-Moreno, pl. 2, figs. 1-12; pl. 3, figs. 1-9.

1969 *Lituonella dinarica*, Gusic, pl. 13, figs. 1-2; pl. 14, figs. 1, 4.

1971 *Parurgonina caelinensis* Hottinger, pl. 1, fig. 29.

Material: In the Birgi Formation, sample no. 224 and 261.

Description: Test is high conical to cylindrical in shape. Proloculus, deuteroloculus and the trochospiral first stage is not distinct. Second stage is rectilinear consisting of uniserially arranged discoidal chambers. Discoidal chambers are divided into numerous chamberlets by "septal lames" and "marginal pillars", in the marginal side. Septal lames are interpreted as "lames helicoidales" by Cuvillier et al. (1968) and as a trochospiral arrangement of marginal chamberlets by Septfontain (1988). Successive chamberlets are alternating in position. Relatively high chamber lumens of the uniserial stage are occupied by subconical-shaped pillars which extend from the chamber floor to the roof. Communication is provided by interpillar oblique openings in the central and marginal regions. Wall is thick and keriothecal, consisting of calcareous material.

Comparison: The *Parurgonina* cf. *caelinensis* (Pl. 70, figs. 3, 5-7) differs from the *Parurgonina caelinensis* (Pl. 69, figs. 3-10; pl. 70, figs. 1-2, 4) in having early conical, later cylindrical shape and relatively high discoidal chambers. The form may be related to the evolution of the *Parurgonina caelinensis*.

Age: The *Parurgonina* cf. *caelinensis* is Kimmeridgian in age in the study.

FUSULININA

Earlandiacea CUMMİNGS, 1955

Earlandiidae CUMMİNGS, 1955

Earlandia PLUMMER, 1930

***Earlandia* sp.**

Pl. 66, fig. 9; pl.70, fig. 8.

Material: In the Upper limestone subunit of the Nohutalan Formation, sample no. 809.

Description: Test has a long cylindrical and relatively wide tubular shape, and is slightly curved. Proloculus is not discernable. It consists of a tubular undivided second chamber. Wall is made up of dark-coloured microgranular calcite, and is thin. Aperture is located at the open end of the tube and is simple.

Age: The *Earlandia* sp. is found in the Early-Middle Liassic time interval.

INVOLUTININA Hohenegger & Piller, 1977

Involutinacea Zaninetti, 1985

Involutinidae BUTSCHLI, 1880

Involutininae BUTSCHLI, 1880

Trocholina PAALZOW, 1922

***Trocholina* sp.**

Pl. 66, fig.12

Material: In the Upper limestone subunit of the Nohutalan Formation, sample no. 45.

Description: Test is low conical in shape. Proloculus is not distinct. It consists of a trochospirally coiled, tubular undivided second chamber. Diameter of the tube increases in growth direction. Transversal section of the tube is circular in shape. Numbers of the whorls are 5. Umbilical cavity is very large and occupied by micritic calcareous material. Wall is thin, simple and it is made up of dark-coloured calcareous material.

Age: The form is found in the Early-Middle Liassic time interval.

Ventrolaminidae WEYNSCHENCK, 1950

Protopeneroplis WEYNSCHENCK, 1950

Protopeneroplis striata WEYNSCHENCK, 1950

Pl. 66, fig. 3.

1950 *Protopeneroplis striata* Weynschenck, pl. 1, fig11-13.

Material: In the Birgi Formation, sample no. 220, 222 and 248.

Description: Test is lenticular in shape. It consists of rapidly enlarging; planispirally to low trochospirally coiled numerous chambers. Numbers of the whorls are two. Coiling is involute. Wall consists of two layers. Inner and outer layers are microgranular and hyaline calcareous, respectively. Septa separating the chambers are made up of microgranular calcareous material or both microgranular and hyaline calcareous material.

Age: To Bassoulet (1996) *P. striata* is Aalenian to Tithonian in age. The form is found in the Kimmeridgian interval, in the study.

LAGENINA

Nodosariacea EHRENBERG,1838

Vaginulinidae REUSS,1860

Lenticulininae CHAPMAN, PARR & COLLİNS, 1934

Lenticulina LAMARCK, 1804

***Lenticulina* sp.**

Pl. 67, figs. 5, 7.

Material: In the Birgi Formation, sample no. 191 and 250.

Description: Test is enrolled and lenticular in shape. Coiling is planispiral involute. The chambers are slightly asymmetrical. It is biumbonate and commonly with umbonal bosses. Numbers of whorls are up to 5. Wall is made up of hyaline calcareous material. As a result of strong recrystallization, its perforated structure is not discernable.

Age: The form is found in the Kimmeridgian interval, in the study.

6. 3. EARLY CRETACEOUS

EARLY CRETACEOUS TAXONOMI

TEXTULARIINA DELAGE & HEROUARD

Lituolacea DE BLAINVILLE, 1827

Mayncinidae LOEBLICH &TAPPAN, 1985

Mayncina NEUMANN, 1965

Mayncina bulgarica LANG, PEYBERNES & REY, 1980

Pl. 71, fig. 1.

1980 Mayncina bulgarica lang, Peybernes & Rey.

Material: In the limestone subunit of the Aktepe Formation, sample no.832.

Description: Test is discoidal to lenticular in shape. It is formed by a probably spherical proloculus, and numerous wide and low chambers. Coiling is planispiral. It has an operculinoid spire, gradually increasing in height. Numbers of whorls are 2-5.

Numbers of chambers are 9, 12 and more than 12, in the first, second and last whorls, respectively. The chambers are divided by thick cribrate septa which are convex towards the apertural face. Wall is made up of agglutinated to microgranular calcareous material and is simple.

Age: The *Mayncina bulgarica* is present in the Albian time interval in the study.

Haplophragmiacea EIMERT & FICKERT, 1899

Nezzazatidae HAMAOUI & SAIT – MARC, 1970

Nezzazatinae HAMAOUI & SAIT – MARC, 1970

Nezzazata OMARA, 1956

Nezzazata simplex OMARA, 1956

Pl. 71, figs. 2-4.

1956 *Nezzazata simplex* Omara, fig. 6, a-g, in text. Pl.102, figs. 7-13.

Material: In the limestone subunit of the Aktepe Formation, sample no. 322.

Description: Test is unequally biconvex in shape, with closed umbilicus. Proloculus is spherical in shape. It consists of numerous chambers with a narrow internal plate extending back from one septum to the previous one and resulting an indentation in the septal suture where it touches the latter. Coiling is trochospiral. Number of the whorls are 2.5. Last whorl is relatively wider than the preceding ones. Wall is made up of microgranular calcareous material. It is simple and imperforate.

Age: To Omara (1956) the form is the Albian (Early Cretaceous) to Turonian (Late Cretaceous) in age. In the study it occurs in the Albian limestones.

***Nezzazata* spp.**

Pl. 71, figs. 4-6.

Material: In the limestone subunit of the Aktepe Formation, sample no. 295 and 296.

Description: Relatively larger or smaller tests are unequally biconvex in shape and have closed umbilicus. The coiling is trochospiral. It consists of numerous chambers with a narrow internal plate extending back from one septum to previous septum resulting a indentation in the septal suture where it touches the latter. Wall is made up of microgranular calcareous material. It is simple and imperforate. Above mentioned individuals are named as Nezzazata spp. because of inefficiency in fossil material.

Age: In the study, *Nezzazata* spp. occurs in the Albian limestone.

Nezzazatinella DARMOIAN, 1976

***Nezzazatinella* sp.**

Pl. 71, fig. 7.

Material: In the limestone subunit of the Aktepe Formation, sample no. 299.

Description: Test is subcircular in shape in its transversal section. It is made up of elongated chambers separated by curved septa. Numbers of chambers are 9 in the last whorl. Last chamber is flaring as if tending to uncoil. Wall is calcareous, microgranular and imperforate.

Age: The *Nezzazatinella* sp. is found in the Albian time interval, in the study area.

Loftusiacea BRADY, 1884

Cyclamminidae MARIE, 1941

Choffatellinae MAYNC, 1958

Pseudocyclammina YABE & HANZAWA, 1926

Pseudocyclammina rugosa

Pl. 74. fig. 3.

(The form was determined by J-P. Masse)

Material: In the limestone subunit of the Aktepe Formation, sample no. 819.

Description: Test is multi-chambered and planispirally coiled. Chambers are subspherical in shape and rapidly increasing in size in growth direction. Numbers of whorls are 3. Wall is made up of coarsely agglutinated calcareous material with coarse subepidermal network. Exoskeleton is represented by a few irregular pillars. Endoskeleton consists of thick and massive septa perforated by large openings.

Age: The *Pseudocyclammina rugosa* is Albian in age, in the study.

Ataxophragmiacea SCHWAGER, 1877

Ataxophragmiidae SCHWAGER, 1877

Ataxophragmiinae SCHWAGER, 1877

Praechrysalidina LUPERTO SINNI, 1979

Praechrysalidina infracretacea LUPERTO SINNI, 1979

Pl. 75, figs. 1-2, 5.

?1975 *Chrysalidina* cf. *gradata* Gusic, pl. 4, fig. 1; pl.9, fig. 2; pl. 10, figs.1, 3-5.

1977 "Pseudochrysalidina" Prestat, pl. 10, figs. 4-5.

1979 *Praechrysalidina infracretacea* n. sp., Luperto-Sinni, pl. 1-3.

Material: In the limestone subunit of the Aktepe Formation, sample no. 283.

Description: Test is high conical in shape. It consists of a spherical proloculus and triserially arranged subglobular overlapping chambers are separated by thick septa which appear as profound sutures on the surface of the test. In the first row communications between the chambers are provided by interseptal lateral openings. Beginning from the second row an apertural plate develops. There is a apertural plate for each overlapping chambers and it is inserted into the following and overlapping chamber. This process gives rise to a columella-like central thickening. There is a opening on the each apertural plate in the earliest row. In the last rows number of openings may increase or they may enlarge, and beginning from central rows rare pillars may occur. Wall is relatively thick, simple or fibered in structure and calcareous.

Comparison: Above mentioned description is comparable with the description of Luperto-Sinni (1979) summarized by Schroeder & Neumann (1985). The described apertural plate corresponds to the "apertural face" of the Luperto-Sinni and a different explanation on the "apertural face" is suggested here.

Age: To Luperto-Sinni (1979) and Schroeder & Neumann (1985) *Praechrysalidina infracretacea* is Aptian to Albian in age. In the study the form is found in the Albian time interval.

cf. *Praechrysalidina infracretacea*

Pl. 75, figs. 6, 8.

?1975 *Chrysalidina* cf. *gradata* Gusic, pl. 4, fig. 1; pl.9, fig. 2; pl. 10, figs.1, 3-5.
1977 "Pseudochrysalidina" Prestat, pl. 10, figs. 4-5.
1979 *Praechrysalidina infracretacea* n. sp., Luperto-Sinni, pl. 1-3.

Material: In the limestone subunit of the Aktepe Formation, sample no. 284.

Description: Test is high conical in shape. It consists of a spherical proloculus and triserially arranged, subglobular, overlapping chambers which are separated by thin septa in the marginal zone of the test. There are a few initial small chambers around of the large proloculus. Communications between initial chambers are not discernible. Beginning from the second row, an expanded "apertural face" develops in the central region of the test. Numerous small vertical and lateral openings are present on the apertural face. Beginning from the central rows, poorly developed pillar appears. Wall is relatively thin. It is made up of tiny canaliculated calcareous material.

Comparison: The form (Pl. 75, figs. 6, 8) differs from *Praechrysalidina infracretacea* (Pl. 77, figs. 1-2, 5) in having thin cribrate wall, well developed and expanded cribrate apertural face, and a central pillar. In the study it is considered that

the form is an evolutionary transition form between the genus *Praechrysalidina* and *Chrysalidina* d'Orbigny (1839).

Age: In the study the form is found in the Albian time interval.

Cuneolinidae SAIDOVA,1981

Cuneolininae SAIDOVA, 1981

Cuneolina D'ORBIGNY, 1839

Cuneolina* gr. *pavonia (D'ORBIGNY, 1846)

Pl. 71, figs. 8, 10.

1846 *Cuneolina pavonia* d' Orbigny, pl. 21, figs 50-52.

Material: In the limestone subunit of the Aktepe Formation, sample no. 303 and 311.

Remarks: In the study, some tangential, oblique or transversal sections of a few individual are investigated. The tests of these forms are large. Figure 8 in plate 71 displays peneropliform test shape. The test consists of biserially arranged chambers. Chambers are divided into several rectangular chamberlets by radial partitions which are perpendicular to the outer wall, and by horizontal partitions parallel to the septa. Wall is calcareous, agglutinated an imperforate with reticulate subepidermal layer (pl. 71, fig. 8). Extremely large size of the test indicates that the form belongs to C. gr. pavonia.

Age: The Form is found in the Albian time interval in the study.

Cuneolina parva NEUMANN, 1967

Pl. 72, fig. 1.

(the species *parva* was determined by J-P Masse, and is described here)

1948 *Cuneolina pavonia* d'Orbigny, var. parva Henson, pl. 14, figs. 1-5; pl. 17, figs 7-12; pl. 18, figs.12-14.

1962 *Cuneolina pavonia* parva, Sartorini & Crescenti, pl. 31, fig. 2, pl. 32, all figs; pl. 33, figs. 4-6.

1967 *Cuneolina parva*, Neumann, pl. 53, fig. 1.

Material: In the limestone subunit of the Aktepe Formation, sample no. 819.

Description: Test is slightly curved cylindrical in shape in the axial section. Apex of the test consists of a slightly twisted eccentric knop. Megalosphere is relatively large. It is partly enveloped by a sub-epidermal cellular layer. Trochospiral stage is not discernable. Second stage consists of biserially arranged chambers. Because of the section orientation and recrystallization, the radial partitions perpendicular to the outer wall and the horizontal partitions parallel to septa are hardly visible. Wall is calcareous, agglutinated an imperforate. Its reticulate subepidermal layer is not discernable.

Age: To Henson (1948) form is Santonian in age. Saint-Marc noted an Aptian to Santonian age for the form. Gusic (1985) also emphasized the existence of the form in the Santonian. In the study it is found in the Albian time interval.

***Cuneolina* sp.**

Pl. 72. fig. 2.

Material: In the limestone subunit of the Aktepe Formation, sample no. 284.

Description: Test is elongated conical in view in the subtransversal section. Embryonic stage and trochospiral first stage is not distinct. The second stage consists of biserially arranged chambers. Radial partitions are visible in the late chambers. Wall is calcareous, agglutinated and imperforate.

Age: The form is found in the Albian time interval, in the study.

Vercorsella ARNAUD – VANNEAU, 1980

Vercorsella arenata ARNAUD – VANNEAU, 1980

Pl. 72, fig. 6.

1966 *Cuneolina conica* d'Orbigny-Iocheva, pl. 1, figs. 20-21.

1973 *Cuneolina compasaurii*, Sartorini & Crescenti-Velic, pl. 4, fig. 6; pl. 7, fig. 1-4.

1980 *Arenovidalina arenata* Arnaud-Vanneau, pl. 46, figs. 1-2; pl. 74, figs. 1-7; figs. 189, 190 (in text).

Material: In the limestone subunit of the Aktepe Formation, sample no. 299.

Description: Test is elongated and flaring in shape. Proloculus is spherical. The test consists of a poorly developed early trochospiral stage which is hardly visible in the presented individual, and a biserially arranged second stage. Radial vertical partitions are increasing in number in successive chambers. Lesser-developed horizontal partitions appear in late chambers. Wall is calcareous, agglutinated with quartz and carbonate grains.

Age: To Arnaud-Vanneau (1980), *V. arenata* is Hauterivian to Bedoulian in age. In the study the form is present in the Albian time interval.

Sabaudiinae BRÖNNIMANN, DECROUEZ & ZANINETTI, 1983

Sabaudia CHAROLLAIS & BRÖNNIMANN, 1965

Sabaudia minuta (HOFKER, 1965), CHAROLLAIS & BRÖNNIMANN, 1965

Pl. 72, figs. 5, 7.

1965 *Textulariella minuta* Hofker, pl. 3, fig. 5c; pl. 4, figs. 1-9.

1965 *Sabaudia minuta* Charollais & Bronnimann, fig. 2, d, f (in text); pl. 1, figs. 5-6.

Material: In the limestone subunit of the Aktepe Formation, sample no. 295 and 311.

Description: Test is high conical in shape with flattened base. Proloculus is followed by 2 or 3 small spherical chambers in the embryonic stage. Apical angle of the embryonic stage is 60^0. Trochospiral first stage is not discernable. Second stage consists of biserially arranged chambers. The chambers are subdivided by numerous vertical subepidermal partitions which are perpendicular to septa. Secondary horizontal partitions of the later chambers are not observed. Wall is made up of two layers in the embryonic stage. Outer layer is hyaline calcite and probably perforate, inner layer is microgranular calcareous material. Wall of the biserial stage is made up of agglutinated calcareous material.

Comparison: *Sabaudia minuta* (Pl. 72, figs. 5, 7) differs from *S. capitata* (pl. 72, fig. 4) in having reduced apical angle and different arrangement of embryonic stage.

Age: To Arnaud-Vanneau (1985) the form is the Hauterivian to Cenomanian. In the study it is found in Albian.

Sabaudia* cf. *capitata

Pl. 72, fig. 4.

1965 *Sabaudia minuta* Charollais & Brönnimann, fig. 1, 2: a-c, fig. 4:a-b (in text); pl. 1, figs. 1-4, 7.

1980 *Sabaudia capitata* n. sp. Arnaud-Vanneau, pl. 51, figs. 8-10, pl. 71, figs. 13-21, pl. 72, 1-6; figs. 192, 194-196.

Material: In the limestone subunit of the Aktepe Formation, sample no. 283.

Description: Test is high conical in shape with flattened base. Proloculus is spherical and relatively large and is followed by a crescent-shaped deuteroloculus which partially envelopes the proloculus. Apical angle of the embryonic stage is 65^0. Trochospiral first stage is not discernable. Oral sides of the chambers are slightly convex and depressed towards the embryonic stage. Second stage consists of biserially arranged chambers. Numbers of chamber pairs are six. The chambers are

subdivided by numerous vertical subepidermal partitions which are perpendicular to septa. Secondary horizontal partitions of the later chambers are not distinct. Wall is made up of two layers in the embryonic stage. Outer layer is hyaline calcite and probably perforate, inner layer is of microgranular calcareous material. Wall of the biserial stage is made up of agglutinated calcareous material.

Comparison: *Sabaudia capitata* (Pl. 72, fig. 4) differs from *S. Minuta* in having increased apical angle, different embryonic stage and chambers with depressed oral faces.

Age: To Arnaud-Vanneau (1985) *Sabaudia capitata* is Late Barremian to Middle Albian in age. In the study it is found in the Albian interval.

Pfenderinidae SMOUT & SUGDEN, 1962

Pfenderininae SMOUT & SUGDEN, 1962

Dobrogelina NEAGU, 1979

***Dobrogelina*? sp.**

Pl. 74, fig. 2.

Material: In the limestone subunit of the Aktepe Formation, sample no. 303.

Remarks: Test is subcircular in shape in its transversal section. It consists of nearly flat low subglobular chambers. Coiling is trochospiral. Numbers of chambers are 7 in last the whorl. The chambers are separated by simple septa. Wall is simple and consists of microgranular calcite. The form is comparable with the species presented by Neagu (1979).

Age: To Neagu (1979) the genus *Dobrogelina* is Berriasian to Barremian in age. The form is found in Albian time interval in the study area.

Orbitolinacea MARTIN, 1890

Orbitolinidae MARTIN, 1890

Orbitolinid foraminifer

Pl. 73. figs. 8.

Material: In the limestone subunit of the Aktepe Formation, sample no. 283.

Description: Test is high and narrow conical in shape. Its embryonic apparatus is not distinct; however, seems to be similar to the genus *Neoiraqia* or *Valdelchella.* Embryonic apparatus is followed by a trochospire consisting of a few discoidal chambers. The following rectilinear stage is consists of discoidal uniserially arranged chambers. Central zone of the chambers of last stage are occupied by vertical endoskeletal pillars.

Age: In the study the form is found in the Albian time interval.

Orbitolininae MARTIN, 1890

Orbitolina D'ORBGNI, 1850

***Orbitolina* (Conicorbitolina) sp.** SCHROEDER, 1973

Pl. 73, figs. 3, 4.

(Subgenus *Conicorbitolina* was determined by Eric Fourcade)

1837 *Orbitolites conica* d'Archiac, pl. Schroeder.

1973 *Orbitolina conicorbitolina* Schroeder.

Material: In the limestone subunit of the Aktepe Formation, sample no. 325 and 326.

Remarks: The embryonic apparatus of the presented forms (Pl. 73, figs. 3-4) are not well discernible. However, the subembryonic zone of the embryonic apparatus is not thinner than that of the deuteroconch, as it is seen in *O. Orbitolina.* Besides, it has a wide marginal zone and its central region is characterized by a reticulate structure. Depending of mentioned characteristics, the form can be attributed to *Orbitolina conicorbitolina.*

Age: To the Schroeder (1973) the age of the form is Early Cretaceous (Vraconnian) to Late Cretaceous (Cenomanian). In the study the form is found in the Albian time interval.

Orbitolina* (*Conicorbitolina*)** SCHROEDER, 1973, **gr. *paenoconica

Pl. 73, figs. 1.

(In the study the subgenus *Conicorbitolina* and species gr. *paenoconica* was determined by J-P. Masse)

1837 *Orbitolites conica* d'Archiac, pl. Schroeder.

1973 *Orbitolina conicorbitolina* Schroeder.

Material: In the limestone subunit of the Aktepe Formation, sample no. 325 and 326.

Remarks: The form (Pl. 73, figs. 1) presents an embryonic apparatus which consists of a protoconch, deuteroconch and subembryonic zone. The deuteroconch is represented bay an alveolar zone belonging to the tangential or transversal sections of the form. The subembryonic zone shows a coarse alveolar structure. However the deuteroloculus is slightly wider than the subembryonic zone of embryonic apparatus. Besides, its wide marginal zone consisting of radial partitions is not distinct. Its central region is characterized by a reticulate structure.

Age: In the study the form is found in the Albian time interval.

***Orbitolina* sp. (1)**

Pl. 73, figs. 2, 4.

Material: In the limestone subunit of the Aktepe Formation, sample no. 325 and 326.

Description: Test is high conical in shape. Embryonic apparatus is not distinct. Post-embryonic stage consists of discoidal successive chambers. The chambers show radial partitions with radial beams and horizontal rafters in outermost marginal zone. Central zone is occupied by vertical, radial and undulating beams which are triangular in section in the inner marginal zone, and by a reticulate zone in the central part.

Age: The form is found in the Albian time interval in the study.

***Orbitolina* sp. (2)**

Pl. 71, fig. 11.

Material: In the limestone subunit of the Aktepe Formation, sample no. 330.

Description: Test is very large, low and expanded conico-concave in shape. Proloculus is a small sphere, however embryonic apparatus is not discernible. The chambers show radial partitions with radial beams and horizontal rafters in outermost marginal zone. Central zone is occupied by vertical, radial and undulating beams.

Age: The form is found in the Albian time interval in the study.

FUSULININA WIDEKIND, 1937

Parathuramminacea BYKOVA, 1955

Moravamminidae POKORNY,1951

Earlandiinae CUMMINGS, 1951

Earlandia PLUMMER, 1930

***Earlandia* sp.**

Pl. 72, fig. 10.

Material: In the limestone subunit of the Aktepe Formation, sample no. 330.

Description: Test has a very long cylindrical and tubular shape, and is straight or slightly curved in the form of "S". The early stage of test is not discernible. The diameter of the tube is relatively large. Wall is made up of dark-coloured microgranular calcite, and is relatively thin with respect to inner diameter of tube. Aperture is located at the open end of the tube

Age: The Form is found in the Albian time interval, in the study area.

INVOLUTININA HOHONEGGER & PILLER, 1977

Involutinacea BÜTSCHLI, 1880

Involutinidae BÜTSCHLI, 1880

Involutininae BÜTSCHLI, 1880

Hensonina MOULLADE & PEYBERNES, 1974

Hensonina lenticularis (HENSON, 1947) MOULLADE & PEYBERNES, 1974

Pl. 73, fig. 10.

1947 *Trocholina lenticularis* Henson, p. 452.

1974 *Hensonina lenticularis* Moullade & Peybernes, p. 178.

Material: In the limestone subunit of the Aktepe Formation, sample no. 837.

Description: Test is lenticular in shape. Proloculus is not distinct. It is formed by a undivided, tubular second chamber. Coiling is planispiral and slightly oscillated. Transversal section of the tubular chamber is distinctly ogival in shape. Umbilical region is occupied by lamellar pillar, resembling *Involutina*. Wall is calcareous.

Age: To Moullade & Peybernes (1974) the age of *Hensonina lenticularis* is Albian to Cenomanian. The form is the Albian in age in the study.

SPIRILLININA HOHENEGGER AND PILLER, 1975

Cornuspiracea SCHULTZE, 1854

Cornuspiridae SCHULTZE, 1854

Cornuspirinae SCHULTZE, 1854

Vidalina SCHLUMBERGER, 1900

***Vidalina?* sp.**

Pl. 73, fig. 9.

Material: In the limestone subunit of the Aktepe Formation, sample no. 295.

Remarks: The form is formed by a spherical proloculus and an undivided tubular second chamber. Coiling is planispiral and slightly oscillating and involute except for last whorl. It is biumbilical and both umbilical sides are represented by a microgranular calcareous mass. Inner structure of the umbilical mass is not distinct. Wall is made up of dark-coloured microgranular calcareous material. However, in the last whorl, a probably hyaline calcitic inner laminae as is explained by Farinacci (1991) seems to be existing. The form is attributed to genus *Vidalina*, with question mark, because of the mentioned features.

Age: The form is Albian in age in the study.

MILIOLINA DELAGE & HEROUARD, 1896

Miliolacea EHRENBERG, 1839

Hauerinidae SCHWAGER, 1876

Sigmoilininae LUCZKOWSKA,1974

Sigmoilina SCHLUMBERGER, 1887

***Sigmoilina* sp.**

Pl. 73, fig. 7.

Material: In the limestone subunit of the Aktepe Formation, sample no. 295.

Remarks: The form is recognized by its distinctly sigmoidal coiling. Proloculus is large and spherical in shape. It is formed by sigmoidally coiled tubular long chambers. The chambers are semispherical in transversal section. Wall is made up of imperforate, porcelaneous calcareous material and is relatively thick.

Age: The *Sigmoilina* sp. is present in the Albian time interval in the study.

Hauerininae SCHWAGER, 1876

Massilina SCHLUMBERGER, 1893

***Massilina* sp.**

Pl. 74, fig. 1.

(The form was determined by J-P. Masse)

Material: In the limestone subunit of the Aktepe Formation, sample no. 295.

Remarks: The form is recognized by its early quinqueloculine, later planispiral coiling, semispherical sections of the chambers and rounded periphery. Wall is made up of porcelaneous calcareous material, imperforate, and is thin and simple.

Age: To Loeblich & Tappan (1988) the form is Early Cretaceous to Holocene in age. It is found in the Albian time interval, in the study.

Sigmoilinitinae LUCZKOWSKA, 1974

Nummoloculina STAINMANN, 1881

Nummoloculina heimi BONET, 1956

Pl. 75, fig. 7, 9-10.

1941 *Nummoloculina* sp. Leupold, pl. 5.

1956 *Nummoloculina heimi* Bonet, pl. 3-4.

1958 *Nummoloculina* sp. Conkin & Conkin, tfs. 1-25; pl. 1, figs. 1-9; emend.

Material: In the limestone subunit of the Aktepe Formation, sample no. 283.

Description: Test is circular in shape in the equatorial section. It consists of a spherical proloculus and "two rapidly enlarging chambers per whorl added in plane less than 180^0 apart to result in an early sigmoid arrangement", as seen in pl. 75, fig. 10. The numbers of chambers per whorl increases in growth direction. The chambers

are separated by wide septa, triangular in section. Thick wall is made up of porcelaneous, imperforate calcareous material.

Age: To Bonet (1956) the form is Albian to Cenomanian in age. In the study it is found in the Albian time interval.

Spiroloculinidae WIESNER, 1920

Spiriloculina D'ORBIGNY, 1826

***Spiroloculina* sp.**

Pl. 73, fig. 6.

Material: In the limestone subunit of the Aktepe Formation, sample no. 295.

Remarks: The form is recognized by its biconcave test, truncated surface, chambers having nearly rectangular shapes in section and a bow-tie like view in nearly axial sections. It is planispirally coiled. Wall is made up of imperforate, porcelaneous calcareous material and it is simple.

Age: The form is found in the Albian time interval, in the study.

Foraminifer indet.

Pl. 71, fig. 9.

Material: In the limestone subunit of the Aktepe Formation, sample no. 307.

Remarks: The form is coiled and biumbilical. Coiling is probably oscillating planispiral. Probably subglobular chambers form the test. Wall is very thick and complex. It consists of agglutinated to granular calcareous material. Some parts of the wall seem as if keriothecal, some parts appear as two layers consisting of an imperforate outer one and alveolar inner layer. The form may be compared with the genus *Malathekerion* which have keriothecal wall and genus *Pseuducyclammina*

having complex alveolar wall. However, as a result of recrystallization, the form could not be determined.

Age: The form occurs in the Albian time interval, in the study.

GLOBUGERININA DELAGE & HÉROUARD, 1896

Rotaliporacea SIGAL, 1958

Favusellidae LONGORIA, 1974

Favusella MICHAEL, 1973

Favusella washitensis (CARSEY, 1926), MICHAEL, 1973.

Pl. 75, figs. 3-4.

(The form was determined by J-P. Masse)

1926 *Globigerina washitensis* Carsey, pl. 7, fig. 10.

1931 *Globigerina washitensis* Plummer, 13, figs. 12: a-b.

1973 *Favusela washitensis* Michel, 1973.

Material: In the limestone subunit of the Aktepe Formation, sample no. 329 and 843.

Description: Test is trochospirally coiled. It consists of rapidly enlarging globular chambers. Numbers of the whorls are 2 or 3. Its surface is reticulated by ridges forming a honeycomb-like pattern. Thin wall is made up of perforate hyaline calcite.

Age: To Caron (1985) *Favusella washitensis* is the Albian to Cenomanian in age. The form presents in the Albian time interval in the study area.

ROTALIINA DELAGE & HÉROUARD, 1896

Rotaliacea EHRENBERG, 1839

Rotaliidae EHRENBERG, 1839

Rotaliinae EHRENBERG, 1839

Rotalia LAMARCK, 1804

Rotalia mesogeensis

Pl. 74, figs. 7-8, 10.

(The form was determined by J-P. Masse)

Material: In the Limestone subunit of the Aktepe Formation, sample no. 330 and 841.

Description: Test is low conical to asymmetrical discoidal in shape. Dorsal side of the test is evolute and ventral side is involute. It consists of trochospirally coiled semispherical chambers which are rapidly increasing in size, in growth directions. Apertural side is occupied by an imperforate lip and astral lobe or folium at the umbilical extremity of the chambers, and by secondary deposits consisting of lamellar pillars, growing on the folium. The chambers are separated by perforated ventral wall. Wall is made up of light-coloured hyaline calcite which is imperforate in the peripheral margin, perforate in ventral region.

Age: *Rotalia mesogeensis* is the Albian in age in the study.

Discorbacea EHRENBERG, 1838

Discorbidae EHRENBERG, 1838

Pl. 72, fig. 9.

Material: In the Limestone subunit of the Aktepe Formation, sample no. 295.

Description: Test is low conical in shape. It consists of trochospirally arranged subglobular chambers. Numbers of whorls are 2.5. Wall is made up of hyaline calcite and is very thin and simple.

Age: The form attributed to family Discorbidae is present in the Albian time interval, in the study.

Bagginidae CUSHMAN, 1927

Baggininae CUSHMAN, 1927

Valvulineria CUSHMAN, 1926

***Valvulineria* sp.**

Pl. 72, fig. 8.

Material: In the Limestone subunit of the Aktepe Formation, sample no. 296.

Description: Test is enrolled and rounded in shape. It consists of trochospirally coiled subglobular chambers which are increasing in size, in growth direction. Numbers of the whorls are 4. Sizes of chambers are smaller in early whorls and rapidely increase in the last whorl. Narrow umbilicus is not profound. Wall is very thin. It is made up of finely perforate microgranular calcareous material.

Age: The *Valvulineria* sp. is Albian in age, in the study

CHAPTER SIX

CONCLUSIONS

7. 1. STRATIGRAPHIC CONCLUSIONS

The basement rocks of the Mesozoic carbonate assemblage are (i) Carboniferous pebbly-sandstone unit, (ii) Carboniferous (Bashkirian) limestone-dolomite unit, (iii) Conglomeratic sandstone-mudstone unit and (iv) Blocky-turbiditic clastic unit.

The Carboniferous pebbly-sandstone unit is conformably overlain by the Carboniferous (Bashkirian) limestone-dolomite unit.

Conglomeratic sandstone-mudstone unit contains clasts of Carboniferous (Bashkirian) limestone-dolomite unit indicating a post-Bashkirian age. The unit envelops the older Carboniferous (Bashkirian) limestone-dolomite unit implying that Bashkirian limestone may be a block in Conglomeratic sandstone-mudstone unit.

Blocky-turbiditic clastic unit envelops the post-Bashkirian Conglomeratic sandstone-mudstone unit, Bashkirian limestone-dolomite unit and underlies the Mesozoic carbonate succession. Its contacts with the post-Bashkirian Conglomeratic sandstone-mudstone unit and the Bashkirian limestone-dolomite unit are covered and problematic.

The Mesozoic carbonate assemblage overlies the Bashkirian limestone unit with a contact which seems to be a stratigraphic unconformity in parts, and the Conglomeratic sandstone-mudstone unit with a plane of displacement in parts.

The Mesozoic carbonate assemblage consists of (i) pre- Middle Anisian or Middle Anisian aged Gerence Formation, (ii) Middle Anisian-Norian aged Camiboğazı Formation, (iii) Norian aged Güvercinlik Formation, (iv) Norian-Liassic aged Nohutalan Formation, (v) Kimmeridgian aged Birgi Formation and (vi) Albian and/or post-Albian aged Aktepe Formation.

The Camiboğazı Formation consists of, from bottom to top, (i) Middle Anisian to Ladinian aged Laleköy member, (ii) Ladinian-Carnian aged Saplazdağı member and (iii) Carnian-Norian aged Hanaylı member.

The Laleköy member is Middle-Late Anisian in age in its lowermost, Late Anisian in age in its middle and Ladinian in age in its uppermost parts, respectively.

The Saplazdağı member is Ladinian in age in its lower and middle parts and Carnian in age in its uppermost 50 m. part, respectively.

The Hanaylı member is Carnian in age in its lowermost 10 m. part and Norian in age in the rest parts, respectively.

The Nohutalan Formation is divided into (i) the Rhaetian-Liassic aged Lower Limestone unit and (ii) the Early-Middle Liassic aged Upper limestone unit, respectively.

The Aktepe Formation is divided into (i) the Albian aged Limestone subunit and (ii) the Albian and/or post-Albian aged Limestone-conglomerate subunit, respectively.

Despite the fact that the contact between the Gerence Formation and the Laleköy member is conformable, local hiatuses are also present due to the environmental changes caused by sudden upliftings and downloadings.

The Laleköy, Saplazdağı and Hanaylı Members of the Camiboğazı Formation are stratigraphically conformable.

The contact between the Hanaylı member and the Güvercinlik Formation is conformable; however, some local shallowness reflected by beach sands are present through the contact.

The Güvercinlik Formation is represented by a continuous succession; however, it contains sporadic hiatuses and intercalations of terrigenous material.

The stratigraphically conformable carbonate succession is continuous through the Güvercinlik and Nohutalan Formations.

The contact between the Upper limestone subunit of the Nohutalan Formation and the Birgi Formation is represented by a bauxitic parallel unconformity corresponding a Middle Liassic to Kimmeridgian time interval.

During the stratigraphic gap reflected by the first bauxitic unconformity, the underlying Upper Triassic rocks were eroded.

The Conglomerate-Limestone subunit of the Aktepe Formation contains pebbles of underlying Late Triassic to Albian rocks.

The contact between the Birgi Formation and the Aktepe Formation is represented by a second bauxitic, almost parallel unconformity corresponding a Kimmeridgian to Albian time interval.

The Mesozoic rocks are compressed, folded and faulted in the study area. The earliest age of this deformation is post-Albian.

The lower parts of Gerence formation is deposited in the deep sea to deep shelf margin conditions, and the upper parts in the deep sea margin to fore-slope

T.C. YÜKSEKÖĞRETİM KURULU
DOKÜMANTASYON MERKEZİ

conditions. The upper parts of the formation consist of organic build up, slope and fore-slope conditions alternated with each other.

Laleköy member is represented by carbonate shelf and slope facies alternation. The lower parts of the member precipitated in the subtidal and intertidal conditions. Uppermost part is represented by biostromal and biohermal formations reflecting organic build up conditions.

The Saplazdağı member of the Camiboğazı Formation entirely precipitated in the open sea shelf and lagoon conditions.

The Hanaylı member of the Camiboğazı Formation precipitated in the restricted circulation shelf and locally in subtidal conditions.

The Güvercinlik Formation reflects local beach conditions and generally repeating restricted circulation shallow carbonate shelf, intertidal and supratidal conditions.

The Lower limestone subunit of the Nohutalan Formation precipitated in the restricted circulation shallow and intertidal conditions. The Upper Limestone subunit precipitated in the alternating subtidal, intertidal and restricted circulation carbonate shelf conditions.

The stratigraphic gap between the Birgi Formation and the Upper limestone subunit of the Aktepe Formation occurred in the coastal lowland conditions.

The Birgi Formation reflects open shelf carbonate platform conditions.

The stratigraphic gap between the Birgi Formation and the Aktepe Formation occurred in the coastal lowland conditions.

The lower and middle parts of the Limestone subunit of the Aktepe Formation precipitated in the alternating open shelf carbonate platform and restricted circulation lagoonal conditions. Its upper part reflects fore-slope conditions.

The Conglomerate-limestone subunit of the Aktepe formation is formed in shallow water marine conditions.

7. 1. PALEONTOLOGIC CONCLUSIONS

In this study, 105 taxa in the Triassic formations, 25 taxa in the Jurassic formation and 28 taxa in the Lower Cretaceous formations are differentiated and determined.

Meandrospira cheni, M. pusilla, Glomospirella grandis, Turrispirillina sp., *Endoteba controversa, E. badoxi, E.* ex. gr. *obturata, Trochammina* cf. *almtalensis, Cornuspira* sp., *Entotebanella* sp. A, B and C, *Lamelliconus multispirus, L. procerus, L. ventroplanus, Endotradella wirzi, Gandinella* ?sp., *G.* sp. aff. *G. falsofriedli, G. falsofriedli Glomospirella* sp. aff. *G. rosetta, G. rosetta, G.* gr. *Expansa, Aulotortus impressus, A. tenuis, Agathammina austroalpina* and *Triasina oberhauseri* are found in the Triassic formations of the Karaburun Peninsula for the first time.

Glomogallerium mlavicensis, G. gazdzickii, Paulbronnimannia judicariensis, Paulbronnimannella whittakeri and *Turriglomina scandonei* are found in the Triassic formations of Turkey for the first time.

Pseudocyclammina liassica, Kilianina cf. lata, Labyrinthina cf. recoarensis, Amijiella amiji, Haurania cf. deserta and *Mesoendothyra croatica* are found in the Jurassic formations of the Karaburun Peninsula for the first time.

Vercorsella arenata, Sabaudia cf. *capitata, Praechrysalidina infracretacea,* cf. *Praechrysalidina* sp., *Sigmoilina* sp., *Limognella* sp. *Nezzazzata simplex, Cuneolina*

parua, Maynicina bulgarica, Rotalia mesogensis, Orbitolina (conicorbitolina) sp., and *Dobrogerina sp.* are determined in the Lower Cretaceous formations of the Karaburun Peninsula for the first time.

"*Textularia*" n. sp., *Glomospirella* n. sp. and Foraminifera n.gen. n. sp. are determined in the Triassic Formations; *Kilinanina uzunkuyuinana* n. sp. is determined in the Jurassic formations of the Karaburun Peninsula for the first time.

The algae *Diplopora* cf. *borzai, Diplopora subtilis* var. *gracca, Physoporella poucifarata* var. *sulcata, Oligoporella pilosa, Clypeina* sp. cf. *bessici, Acicularia* sp., cf. *Poikiloporella dublicata* and *Gyroporella* sp. are found in the Triassic formations of the Karaburun Peninsula for the first time.

The occurrences of the algae *Cylindroporella kochanskayae, C. ivanovici, C.* cf. *ivanovici, Hensonella urdalasi, Heteroporella lepina, Neomeris* sp., *Salingoporella hasi, S.* cf. *milanovici, S.* cf. *turgida* and *Terquemella* cf. *antigua*, and Albian rudists in the Lower Cretaceous formations are determined for the first time.

The following biozones are described and four of them are suggested in this study for the first time: For Triassic formations, in ascending order, *Meandrospira dinarica* concurrent range zone for Middle Anisian, *Turriglomina mesotriassia* range zone for Pelsonien-Cordevalien, *Triadodiscus eomesozoicus* partial range zone for Ladinian-Carnian, *Aulotortus communis* interval zone for Early Norian, *Triasina oberhauseri* range zone for Middle Norian, *Triasina hantkeni* for Middle-Late Rhaetian; and in Jurassic formations, *Orbitopsella praecursor* range zone for Late Pliensbaschian.

The stratigraphic range of *Meandrospira cheni* which was recorded as Late Scythian and *Glomospirella praedensa* which was recorded as Scythian in age in the literature, is suggested to be extended to Middle Anisian according to the data obtained from the study.

The occurence of *Lamelliconus biconvexsus* and *L. ventroplanus* in the Late Anisian-Norian time interval is proven, for which a probable Anisian to Norian age was recorded in the literature. *Lamelliconus procerus*-like appear in Late Anisian and the true *Lamelliconus procerus* appears in the Ladinian-Carnian time interval as recorded in the literature. However, its also occur in Norian in the Karaburun Peninsula.

The stratigraphic range of *Paleolituonella mediterraneus* for which a probable Late Carnian to Norian age was recorded in the literature, is suggested to be extended to Norian, according to the data obtained from the study.

The occurrence of Liassic *Paleodasycladus mediterraneus* and Albian *Salpingoporella ?turgida, S. milanovici, Cylindroporella kochanskyae* and *Terquemella antigua* indicate a southern Tethys origin.

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APPENDICES

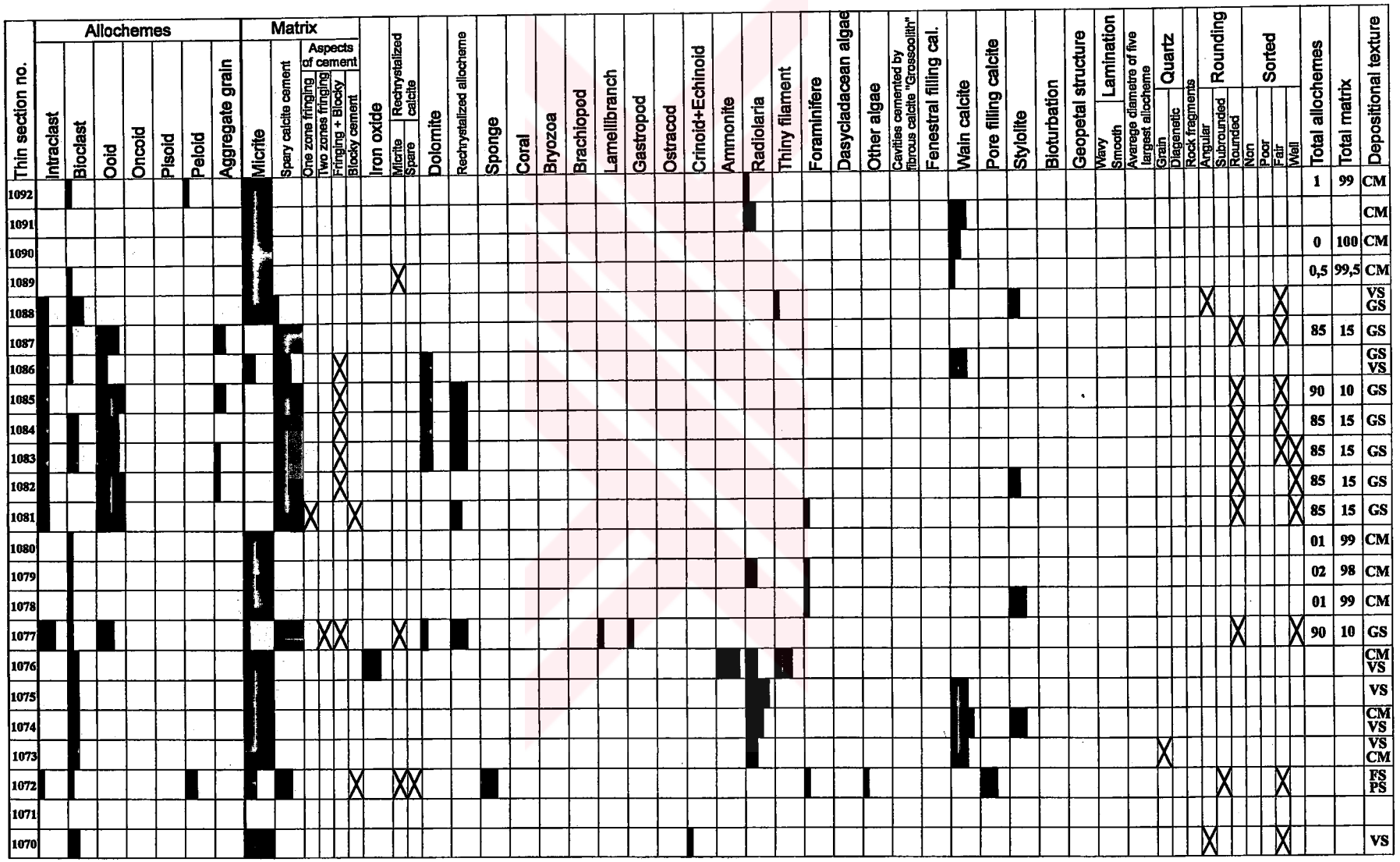
TABLES:

RESULTS of THE DETAILED PETROGRAPHICAL ANALYSES

Table 4. 1. Explanations for Figures 4. 1 to 4. 10

924		923	Thin section no.	
% 5 Very rare, % 10rare, 15 Modarate, % 25 Abundant, >%25 Very Ab.	Very rare		Intraclast	Allochemes
% 5 Very rare, % 10rare, 15 Modarate, % 25 Abundant, >%25 Very Ab.	Rare		Bioclast	
% 3 Very rare, % 6 rare, %15 Modarate, % 25 Abundant, >%25 Very Ab.	Modarate		Ooid	
% 1 Very rare, % 3 rare, %5 Modarate, % 10 Abundant, >%10 Very Ab.	Abundant		Oncoid	
% 1 Very rare, % 3 rare, %5 Modarate, % 10 Abundant, >%10 Very Ab.	Very abundant		Pisoid	
% 5 Very rare, % 10rare, 15 Modarate, % 25 Abundant, >%25 Very Ab. of total allochem			Peloid	
% 1 Very rare, % 3 rare, %5 Modarate, % 10 Abundant, >%10 Very Ab. of total matrix			Aggregate grain	
%20 Very rare, %40 rare, %60 Modarate, %80 Abundant, >%100 Very Ab. of total matrix			Micrite	Matrix
			Spary calcite cement	
			One zone fringing	Aspects of cement
			Two zones fringing	
			Fringing + Blocky	
			Blocky cement	
X exist			Iron oxide	
X exist			Micrite	Rechrystalized calcite
X exist			Spare	
%20 Very rare, %40 rare, %60 Modarate, %80 Abundant, >%100 Very Ab. of total rocks			Dolomite	
%20 Very rare, %40 rare, %60 Modarate, %80 Abundant, >%100 Very Ab. of total matrix			Rechrystalized allocheme	
Individual per 5x5 cm thin section, 1 vey rare, 2 rare, 3 modarete, 4 abundant, >4 very abundat			Sponge	
Individual per 5x5 cm thin section, 1 vey rare, 2 rare, 3 modarete, 4 abundant, >4 very abundat			Coral	
Individual per 5x5 cm thin section, 1 vey rare, 2 rare, 3 modarete, 4 abundant, >4 very abundat			Bryozoa	
Individual per 5x5 cm thin section, 1 vey rare, 2 rare, 3 modarete, 4 abundant, >4 very abundant			Brachiopod	
Individual per 5x5 cm thin section, 1 vey rare, 2 rare, 4 modarete, 64 abundant, >6 very abundant			Lamellibranch	
Individual per 5x5 cm thin section, 1 vey rare, 2 rare, 4 modarete, 64 abundant, >6 very abundant			Gastropod	
Individual per 5x5 cm thin section, 1 vey rare, 2 rare, 4 modarete, 64 abundant, >6 very abundant			Ostracod	
Individual per 5x5 cm thin section ,2 vey rare ,4 rare, 6 modarete, 8 abundant, >8 very abundant			Crinoid+Echinoid	
Individual per 5x5 cm thin section ,1 vey rare ,2 rare, 3 modarete,4 abundant, >4 very abundant			Ammonite	
Individual per 5x5 cm thin section ,5 vey rare ,10 rare, 20 modarete, 50 abundant, >50 very abundat			Radiolaria	
Individual per 5x5 cm thin section ,5 vey rare ,10 rare, 15 modarete, 20 abundant, >20 very abundant			Thin filament	
Individual per 5x5 cm thin section 25 vey rare , 5 rare, 10 modarete, 15 abundant, >15 very abundant			Foraminifer	
Individual per 5x5 cm thin section 1 vey rare , 2 rare, 3 modarete, 4 abundant, >4 very abundant			Dasycladacean algae	
Individual per 5x5 cm thin section 1 vey rare , 2 rare, 3 modarete, 4 abundant, >4 very abundant			Other algae	
% of total cement 10 vey rare , 20 rare, 30 modarete, 50 abundant, >50 very abundant			Cavities cemented by fibrous calcite "Grossoolith"	
% of per 5x5 cm thin section 5 vey rare , 10 rare, 15 modarete, 30 abundant, >30 very abundant			Fenestral filling cal.	
number ofwain in 5x5 cm thin section 3 vey rare , 6 rare, 10 modarete,20 abundant, >20 very abundant			Vein calcite	
% of in 5x5 cm thin section 3 vey rare , 6 rare, 10 modarete,20 abundant, >20 very abundant			Pore filling calcite	
number of fructure in 5x5 cm thin section 1 vey rare, 2 rare, 3 modarete,4 abundant, >4 very abundant			Stylolite	
number od bioturbated area in 5x5 cm thin section 1 vey rare , 2 rare, 3 modarete, 4 abundant, >4 very aburidant			Bioturbation	
% of per 5x5 cm thin section 5 vey rare , 10 rare, 15 modarete, 30 abundant, >30 very abundant			Geopetal structure	
			Wavy	Lamination
			Smooth	
			Avarege diametre of five largest allocheme	
			Grain	Quartz
			Diagenetic	
			Rock fragments	
			Angular	Rounding
			Subrounded	
			Rounded	
			Non	Sorted
			Poor	
			Fair	
			Well	
			Total allochemes	
CM:Carbonate mudstone, WS: Wackestone, PS: packstone, GS: grainstone, FLS: floadstone			Total matrix	
RD: rudstone, BIS: Bindstone, FR: fraime stone		CM WS	Depositional texture	

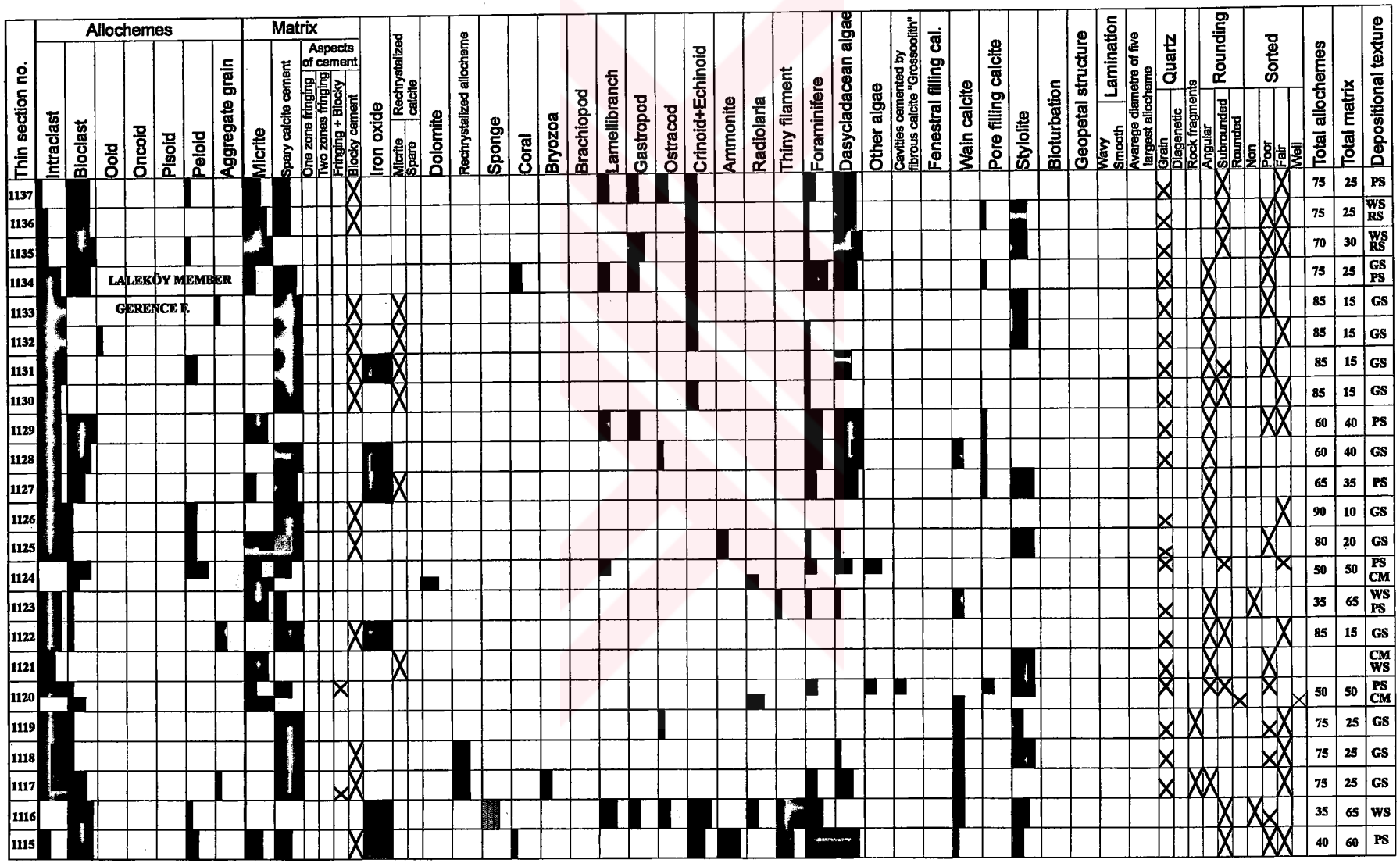
Table 4. 2 Results of the Detailed Petrographical Analyses of the gerence Formation (Stratotype no. 1).



Continued

| Thin section no. | Allochemes: Intraclast | Bioclast | Ooid | Oncoid | Pisoid | Peloid | Aggregate grain | Matrix: Micrite | Spary calcite cement | Aspects of cement: One zone fringing | Two zones fringing | Fringing + Blocky | Blocky cement | Iron oxide | Micrite | Recrystallized Spare calcite | Dolomite | Recrystallized allochneme | Sponge | Coral | Bryozoa | Brachiopod | Lamellibranch | Gastropod | Ostracod | Crinoid+Echinoid | Ammonite | Radiolaria | Thiny filament | Foraminifere | Dasycladacean algae | Other algae | Cavities cemented by fibrous calcite "Grossoolith" | Fenestral filling cal. | Vein calcite | Pore filling calcite | Stylolite | Bioturbation | Geopetal structure | Lamination: Wavy | Lamination: Smooth | Average diameter of five largest allochneme | Quartz: Grain | Quartz: Diagenetic | Rock fragments | Rounding: Angular | Rounding: Subrounded | Rounding: Rounded | Sorted: Non | Sorted: Poor | Sorted: Fair | Sorted: Well | Total allochemes | Total matrix | Depositional texture |
|---|---|---

Table 4. 3 Results of the Detailed Petrographical Analysys of the Laleköy Member of the Camiboğazı Formation (Stratotype n. 1)



Continued

Thin section no.
Allochemes
intraclast
Bioclast
Ooid
Oncoid
Pisoid
Peloid
Aggregate grain
Micrite
Matrix
Spary calcite cement
One zone fringing
Two zones fringing
Fringing + Blocky
Blocky cement
Aspects of cement
iron oxide
Micrite
Recrystallized
Spare
calcite
Dolomite
Recrystallized allochem
Sponge
Coral
Bryozoa
Brachiopod
Lamellibranch
Gastropod
Ostracod
Crinoid+Echinoid
Ammonite
Radiolaria
Thiny filament
Foraminifere
Dasycladacean algae
Other algae
Cavities cemented by fibrous calcite "Grosscolith"
Fenestral filling cal.
Main calcite
Pore filling calcite
Stylolite
Bioturbation
Geopetal structure
Lamination
Wavy
Smooth
Average diameter of five largest allochems
Quartz
Grain
Diagenetic
Rock fragments
Rounding
Angular
Subrounded
Rounded
Non
Sorted
Poor
Fair
Well
Total allochemes
Total matrix
Depositional texture
1160 80 20 GS
1159 85 15 GS
1158 80 20 GS
1157 80 20 GS
1156 80 20 GS
1155 80 20 GS
1154 80 20 GS
1153 80 20 GS
1152 80 20 GS
1151 80 20 GS
1150 50 50 WS GS
1149 <10 >90 CM WS
1148 10 90 CM
1147 30 70 CM WS
1146 50 50 GS WS
1145 50 50 YT
1144 70 30 PS
1143 15 85 WS
1142 15 85 WS
1141 20 80 WS
1140 40 60 PS
1140 10 90 CM
1139 85 15 GS
1138 50 50 KT

Continued

Thin section no.
Allochemes
Intraclast
Bioclast
Oncoid
Pisoid
Peloid
Aggregate grain
Matrix
Micrite
Sparry calcite cement
Aspects of cement:
One zone fringing
Two zones fringing
Fringing + Blocky
Blocky cement
Iron oxide
Recrystallized spare calcite
Micrite
Dolomite
Recrystallized allochem
Sponge
Coral
Bryozoa
Brachiopod
Lamellibranch
Gastropod
Ostracod
Crinoid+Echinoid
Ammonite
Radiolaria
Thiny filament
Foraminifere
Dasycladacean algae
Other algae
Cavities cemented by fibrous calcite "Grossoolith"
Fenestral filling cal.
Wavy laminations
Pore filling calcite
Stylolite
Bioturbation
Geopetal structure
Lamination
Wavy
Smooth
Average diameter of five largest allochems
Quartz
Grain
Diagenetic
Rock fragments
Rounding
Angular
Subrounded
Rounded
Sorted
Non
Poor
Fair
Well
Total allochemes
Total matrix
Depositional texture
1183 50 50 FS GS
1182 30 70 CM WS
1181 65 35 GS
1180 65 35 GS
1179 60 40 WS GS
1178 70 30 GS
1177 75 25 GS
1176 70 30 GS
1175 70 30 GS
1174 80 20 GS
1173 55 45 GS WS
1172 85 15 GS
1171 50 50 WS GS
1170 50 50 WS GS
1169 85 15 GS
1168 85 15 GS
1167 30 70 CM WS
1166 85 15 GS
1165 85 15 GS
1164 85 15 GS
1163 80 20 GS
1162 80 20 GS
1161 85 15 GS

Continued

Thin section no.
Allochemes
Intraclast
Bioclast
Ooid
Oncoid
Pisoid
Peloid
Aggregate grain
Matrix
Micrite
Spary calcite cement
Aspects of cement
One zone fringing
Two zones fringing
Fringing + Blocky
Blocky cement
Iron oxide
Recrystallized calcite
Micrite
Spare
Dolomite
Recrystallized allochneme
Sponge
Coral
Bryozoa
Brachiopod
Lamellibranch
Gastropod
Ostracod
Crinoid+Echinoid
Ammonite
Radiolaria
Thiny filament
Foraminifere
Dasycladacean algae
Other algae
Cavities cemented by fibrous calcite "Grossoolith"
Fenestral filling cal.
Vein calcite
Pore filling calcite
Stylolite
Bioturbation
Geopetal structure
Lamination
Wavy
Smooth
Average diameter of five largest allochneme
Quartz
Grain
Diagenetic
Rock fragments
Rounding
Angular
Subrounded
Rounded
Non
Sorted
Poor
Fair
Well
Total allochemes
Total matrix
Depositional texture
1206 GS
1205 FS
1204 GS 75 25
1203 GS 60 40
1202 GS FS 75 25
1201 FS RD
1200 FS RD
1199 FS
1198 FS RD
1197 FS
1196 FS RD
1195 BS GS
1194 GS 65 35
1193 FS GS 65 35
1192 WS CM 30 70
1191 CM GS 40 60
1190 GS WS 60 40
1189 WS CM 35 75
1188 FS
1187 GS 70 30
1186 GS 70 30
1185 MS WS 30 70
1184 GS 80 20

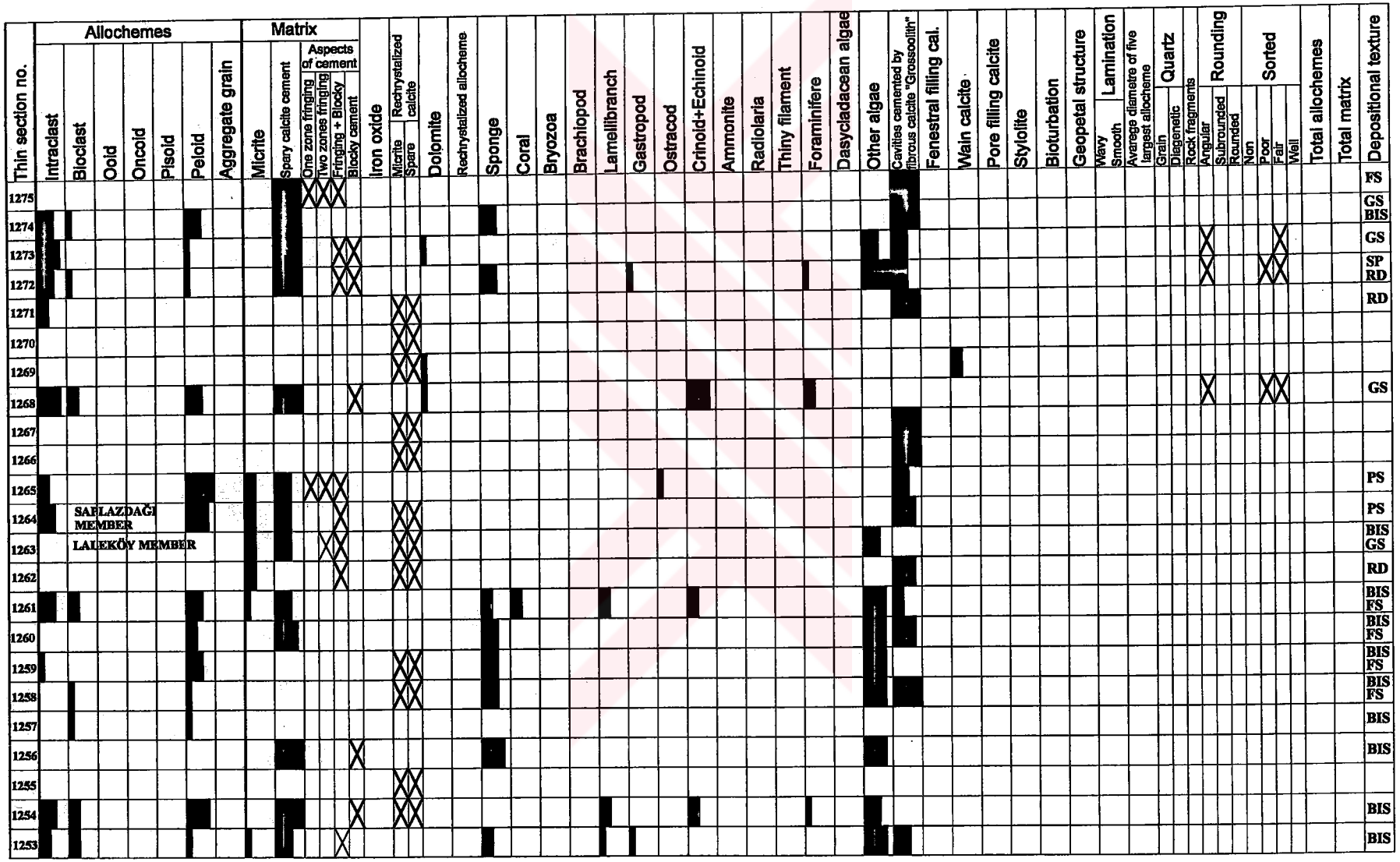
Continued

Thin section no.
Allochemes
Intraclast
Bioclast
Ooid
Oncoid
Pisoid
Pelloid
Aggregate grain
Micrite
Matrix
Spary calcite cement
Aspects of cement
One zone fringing
Two zones fringing
Fringing + Blocky
Blocky cement
Iron oxide
Micrite
Recrystallized calcite
Spare calcite
Dolomite
Recrystallized allochem
Sponge
Coral
Bryozoa
Brachiopod
Lamellibranch
Gastropod
Ostracod
Crinoid+Echinoid
Ammonite
Radiolaria
Thiny filament
Foraminifere
Dasycladacean algae
Other algae
Cavities cemented by fibrous calcite "Grosscolith"
Fenestral filling cal.
Vein calcite
Pore filling calcite
Stylolite
Bioturbation
Geopetal structure
Lamination
Wavy
Smooth
Average diameter of five largest allochems
Quartz
Grain
Diagenetic
Rock fragments
Rounding
Angular
Subrounded
Rounded
Sorted
Non
Poor
Fair
Well
Total allochemes
Total matrix
Depositional texture
1229
1228
1227
1226
1225
1224
1223
1222
1221
1220
1219
1218
1217
1216
1215
1214
1213
1212
1211
1210
1209
1208
1207
FS
FS RD
FS
GS CM
FS RD
GS WS
FS RD
GS
FS
FS
FS
FS
FS
GS
FS
FS
FS
FS
GS WS
FS RD
FS
GS
FS
FS
75
25
70
30
50
50
50
50
55
45

Continued

Thin section no.
Allochemes
Intraclast
Bioclast
Ooid
Oncoid
Pisoid
Peloid
Aggregate grain
Micrite
Matrix
Spary calcite cement
Aspects of cement
One zone fringing
Two zones fringing
Fringing + Blocky
Blocky cement
Iron oxide
Micrite
Recrystallized calcite
Spare
Dolomite
Recrystallized allochem
Sponge
Coral
Bryozoa
Brachiopod
Lamellibranch
Gastropod
Ostracod
Crinoid+Echinoid
Ammonite
Radiolaria
Thiny filament
Foraminifere
Dasycladacean algae
Other algae
Cavities cemented by fibrous calcite "Grosscolith"
Fenestral filling cal.
Vein calcite
Pore filling calcite
Stylolite
Bioturbation
Geopetal structure
Lamination
Wavy
Smooth
Average diameter of five largest allochems
Quartz
Grain
Diagenetic
Rock fragments
Rounding
Angular
Subrounded
Rounded
Sorted
Non
Poor
Fair
Well
Total allochemes
Total matrix
Depositional texture
1252 BIS GS
1251 RS
1250 BIS GS
1249
1248
1247 BIS GS
1246 BIS FS
1245 BIS GS
1244
1243
1242 BIS GS
1241 BIS FS
1240 FS
1239 BIS FS
1238 BIS GS
1237 BIS FS
1236 BIS GS
1235 GS 85 15
1234 BIS FS
1233
1232 BIS FS
1231 BIS FS
1230 BIS FS

Table 4. 4 Results of the Detailed Petrographical Analyses of the Saplazdağı Member of the Camiboğazı Formation (Stratotype n. 1)



Continued

Thin section no.
Allochemes
Intraclast
Bioclast
Ooid
Oncoid
Pisoid
Peloid
Aggregate grain
Matrix
Micrite
Spary calcite cement
Aspects of cement
One zone fringing
Two zones fringing
Fringing + Blocky
Blocky cement
Iron oxide
Micrite
Recrystallized calcite
Spare calcite
Dolomite
Recrystallized allochem
Sponge
Coral
Bryozoa
Brachiopod
Lamellibranch
Gastropod
Ostracod
Chinoid+Echinoid
Ammonite
Radiolaria
Thiny filament
Foraminifere
Dasycladacean algae
Other algae
Cavities cemented by fibrous calcite "Grossolith"
Fenestral filling cal.
Vein calcite
Pore filling calcite
Stylolite
Bioturbation
Geopetal structure
Lamination
Wavy
Smooth
Average diametre of five largest allochems
Quartz
Grain
Diagenetic
Rock fragments
Rounding
Angular
Subrounded
Rounded
Sorted
Non
Poor
Fair
Well
Total allochemes
Total matrix
Depositional texture
1298 FS
1297 GS
1296 GS
1295 BIS
1294 GS BIS
1293
1292 GS
1291
1290 GS
1289 GS
1288 GS
1287 BIS
1286 BIS
1285 BIS FS
1284 BIS
1283 GS
1282 FS
1281 FS
1280 BIS
1279 BIS GS
1278 GS
1277 BIS
1276 BIS

Continued

Thin section no.
Allochemes
Intraclast
Bioclast
Ooid
Oncoid
Pisoid
PelOid
Aggregate grain
Matrix
Micrite
Spary calcite cement
Aspects of cement
One zone fringing
Two zones fringing
Fringing + Blocky
Blocky cement
Iron oxide
Micrite
Recrystallized calcite
Spare calcite
Dolomite
Recrystallized allochem
Sponge
Coral
Bryozoa
Brachiopod
Lamellibranch
Gastropod
Ostracod
Crinoid+Echinoid
Ammonite
Radiolaria
Thiny filament
Foraminifere
Dasycladacean algae
Other algae
Cavities cemented by fibrous calcite "Grossoolith"
Fenestral filling cal.
Vein calcite
Pore filling calcite
Stylolite
Bioturbation
Geopetal structure
Lamination
Wavy
Smooth
Average diameter of five largest allochems
Quartz
Grain
Diagenetic
Rock fragments
Rounding
Angular
Subrounded
Rounded
Sorted
Non
Poor
Fair
Well
Total allochemes
20
80
Total matrix
Depositional texture
BIS FS
BIS GS
GS WS
BIS FS
BIS FS
BIS FS
BIS GS
BIS FS
BIS FS
PS
GS PS
GS
GS
BIS FS
GS
BIS
WS GS
BIS
BIS FS
1321
1320
1319
1318
1317
1316
1315
1314
1313
1312
1311
1310
1309
1308
1307
1306
1305
1304
1303
1302
1301
1300
1299

Continued

Thin section no.
Allochemes
intraclast
Bioclast
Ooid
Oncoid
Pisoid
Peloid
Aggregate grain
Micrite
Matrix
Sparry calcite cement
One zone fringing
Two zones fringing
Fringing + Blocky
Blocky cement
Aspects of cement
Iron oxide
Micrite
Recrystallized calcite
Spare
Dolomite
Recrystallized allochneme
Sponge
Coral
Bryozoa
Brachiopod
Lamellibranch
Gastropod
Ostracod
Crinoid+Echinoid
Ammonite
Radiolaria
Thiny filament
Foraminifere
Dasycladacean algae
Other algae
Cavities cemented by fibrous calcite "Grosscolith"
Fenestral filling cal.
Wain calcite
Pore filling calcite
Stylolite
Bioturbation
Geopetal structure
Lamination
Wavy
Smooth
Average diameter of five largest allochneme
Grain
Quartz
Diagenetic
Rock fragments
Angular
Subrounded
Rounded
Rounding
Non
Poor
Fair
Well
Sorted
Total allochemes
Total matrix
Depositional texture
1321
1320
1319
1318
1317
1316
1315
1314
1313
1312
1311
1310
1309
1308
1307
1306
1305
1304
1303
1302
1301
1300
1299
BIS FS
BIS GS
GS WS
BIS FS
BIS FS
BIS FS
BIS GS
BIS FS
BIS FS
PS
GS PS
GS
GS
BIS FS
GS
BIS
W/S GS
BIS
BIS FS
80
20

Continued

Thin section no.
Allochemes
intraclast
Bioclast
Ooid
Oncoid
Pisoid
Peloid
Aggregate grain
Matrix
Micrite
Spary calcite cement
Aspects of cement
One zone fringing
Two zones fringing
Fringing + Blocky
Blocky cement
iron oxide
Micrite
Spare
Recrystallized calcite
Dolomite
Recrystallized allochneme
Sponge
Coral
Bryozoa
Brachiopod
Lamellibranch
Gastropod
Ostracod
Crinoid+Echinoid
Ammonite
Radiolaria
Thiny filament
Foraminifere
Dasycladacean algae
Other algae
Cavities cemented by fibrous calcite "Grosscolith"
Fenestral filling cal.
Vein calcite
Pore filling calcite
Stylolite
Bioturbation
Geopetal structure
Lamination
Wavy
Smooth
Average diameter of five largest allochneme
Quartz
Grain
Degenetic
Rock fragments
Rounding
Angular
Subrounded
Rounded
Non
Sorted
Poor
Fair
Well
Total allochemes
Total matrix
Depositional texture
1344
1343 BIS FS
1342 BIS FS
1341 WS GS
1340
1339
1338 BIS GS
1337 BIS FS
1336 BIS FS
1335 BIS GS
1334 GS
1333 BIS FS
1332 GS BIS
1331 FS
1330 FS
1329 BIS GS
1328 GS
1327 BIS FS
1326 BIS FS
1325 GS BIS
1324 GS
1323 BIS FS
1322 GS BIS

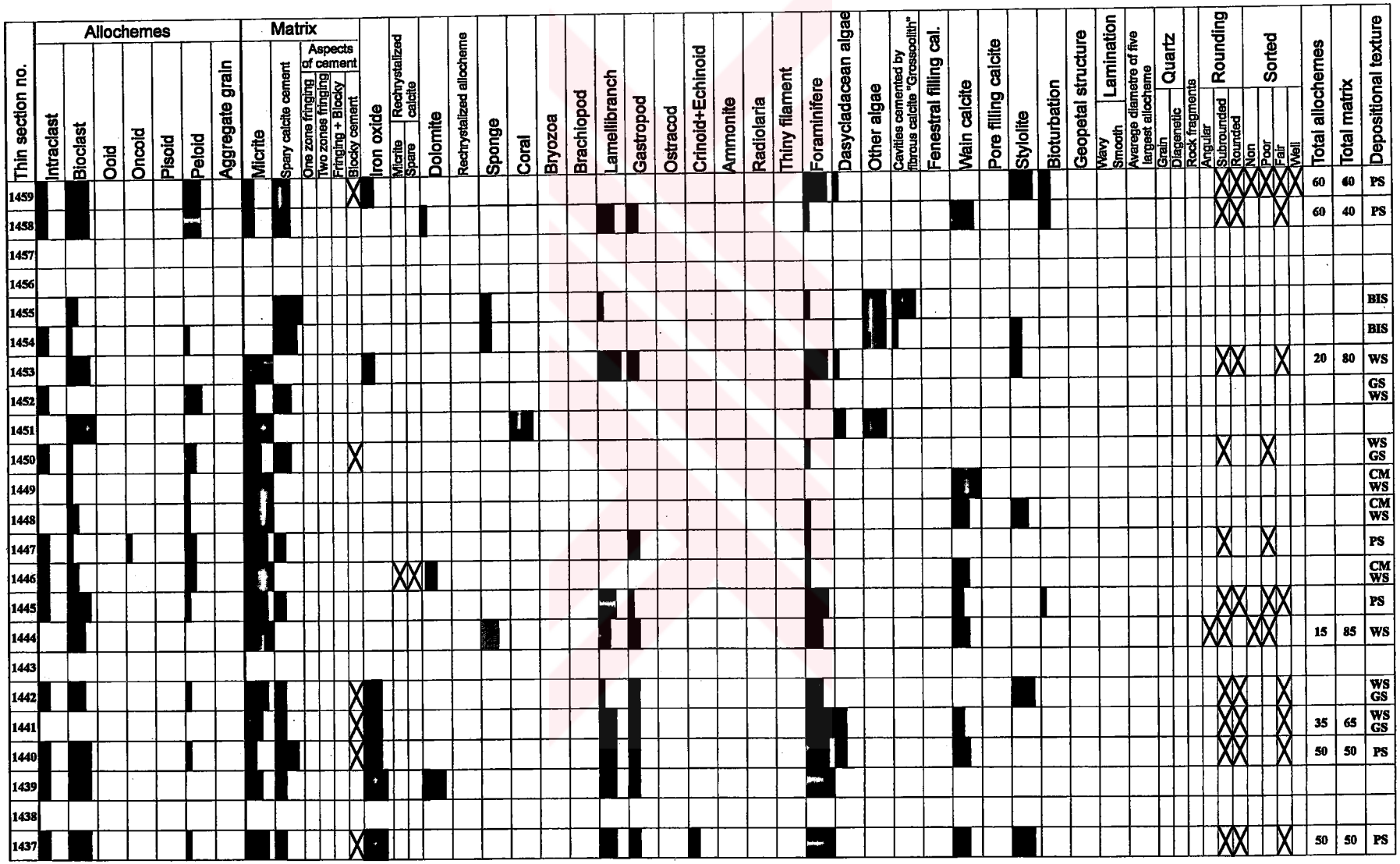
Continued

Thin section no.
Allochemes
Intraclast
Bioclast
Ooid
Oncoid
Pisoid
Peloid
Aggregate grain
Matrix
Micrite
Spray calcite cement
Aspects of cement
One zone fringing
Two zones fringing
Fringing + Blocky
Blocky cement
iron oxide
Micrite
Recrystallized calcite
Spare calcite
Dolomite
Recrystallized allochem
Sponge
Coral
Bryozoa
Brachiopod
Lamellibranch
Gastropod
Ostracod
Crinoid+Echinoid
Ammonite
Radiolaria
Thiny filament
Foraminifere
Dasycladacean algae
Other algae
Cavities cemented by fibrous calcite "Grassocilith"
Fenestral filling cal.
Vein calcite
Pore filling calcite
Stylolite
Bioturbation
Geopetal structure
Lamination
Wavy
Smooth
Average diameter of five largest allochems
Quartz
Grain
Diagenetic
Rock fragments
Rounding
Angular
Subrounded
Rounded
Sorted
Poor
Fair
Well
Total allochemes
Total matrix
Depositional texture
CM
WS GS
WS
BIS
BIS FS
PS
BIS
GS
BIS FS
BIS FS
CS
WS GS
WS
WS
BIS GS
BIS FS
WS
PS
PS
WS
50
50
85
15
1413
1412
1411
1410
1409
1408
1407
1406
1405
1404
1403
1402
1401
1400
1399
1398
1397
1396
1395
1394
1393
1392
1391

Continued

Thin section no.
Allochemes
intraclast
Biolast
Ooid
Oncoid
Pisoid
Peloid
Aggregate grain
Matrix
Micrite
Spary calcite cement
Aspects of cement
One zone fringing
Two zones fringing
Fringing + Blocky
Blocky cement
Iron oxide
Micrite
Spare
Recrystallized
calcite
Recrystallized
Dolomite
Spar
Recrystallized allochem
Sponge
Coral
Bryozoa
Brachiopod
Lamellibranch
Gastropod
Ostracod
Crinoid+Echinoid
Ammonite
Radiolaria
Thiny filament
Foraminifere
Dasycladacean algae
Other algae
Cavities cemented by
fibrous calcite "Grosscolith"
Fenestral filling cal.
Vein calcite
Pore filling calcite
Stylolite
Bioturbation
Geopetal structure
Lamination
Wavy
Smooth
Average diameter of five
largest allochems
Quartz
Grain
Diagenetic
Rock fragments
Angular
Rounding
Subrounded
Rounded
Non
Sorted
Poor
Fair
Well
Total allochemes
Total matrix
Depositional texture
GS
WS
BIS
FS
PS
CM
WS
GS
1436
1435
1434
1433
1432
1431
1430
1429
1428
1427
1426
1425
1424
1423
1422
1421
1420
1419
1418
1417
1416
1415
1414

Table 4. 5 Results of the Detailed Petrographical Analyses of the Hanaylı member of the Camiboğazı Formation (Stratptype n. 1)



Continued

Thin section no.
Allochemes
intraclast
Bioclast
Oold
Oncoid
Pisoid
Peloid
Aggregate grain
Matrix
Micrite
Spary calcite cement
Aspects of cement
One zone fringing
Two zones fringing
Fringing + Blocky
Blocky cement
iron oxide
Micrite
Recrystallized
Spare
calcite
Dolomite
Recrystallized allochneme
Sponge
Coral
Bryozoa
Brachiopod
Lamellibranch
Gastropod
Ostracod
Crinoid+Echinoid
Ammonite
Radiolaria
Thiny filament
Foraminifere
Dasycladacean algae
Other algae
Cavities cemented by
fibrous calcite "Grossolith"
Fenestral filling cal.
Vein calcite
Pore filling calcite
Stylolite
Bioturbation
Geopetal structure
Lamination
Wavy
Smooth
Average diameter of five
largest allochneme
Quartz
Grain
Diagenetic
Rock fragments
Rounding
Angular
Subrounded
Rounded
Sorted
Non
Poor
Fair
Well
Total allochemes
Total matrix
Depositional texture
1482
1481
1480
1479
1478
1477
1476
1475
1474
1473
1472
1471
1470
1469
1468
1467
1466
1465
1464
1463
1462
1461
1460
WS
GS
40
60
PS
50
75
25
WS
PS
50
60
40
60
40
60
PS
GS
80
20
PS
GS
65
35
PS
GS
35
65
PS
50
PS
WS
50
PS
50
PS
40
60
PS
GS
40
60
PS
WS
50
PS
40
60

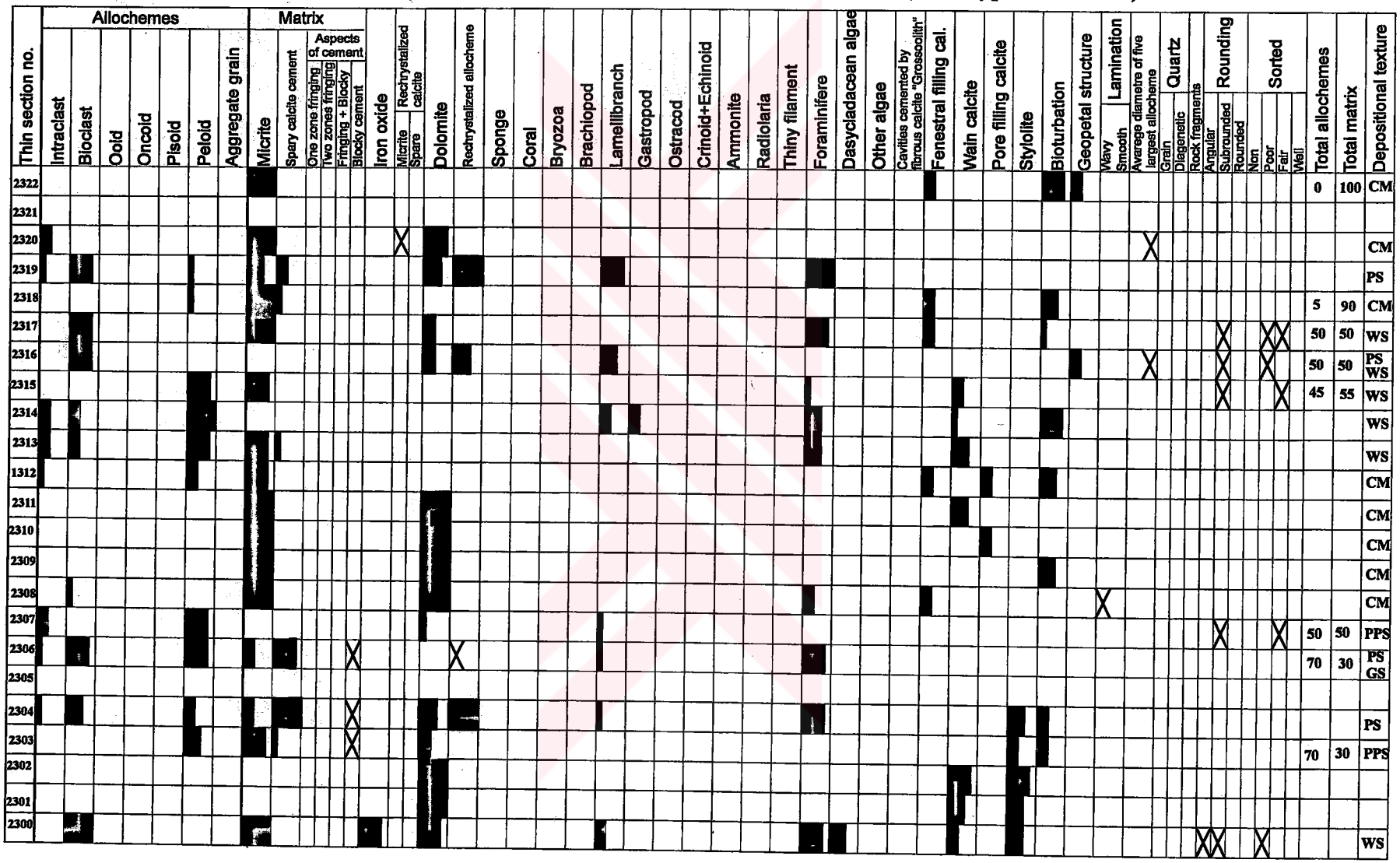
Continued

Thin section no.
Allochemes
intraclast
Bioclast
Oold
Oncoid
Pisoid
Pelold
Aggregate grain
Matrix
Micrite
Sparry calcite cement
Aspects of cement
One zone fringing
Two zones fringing
Fringing + Blocky
Blocky cement
iron oxide
Micrite
Recrystallized Spare calcite
Dolomite
Recrystallized allochneme
Sponge
Coral
Bryozoa
Brachiopod
Lamellibranch
Gastropod
Ostracod
Crinoid+Echinoid
Ammonite
Radiolaria
Thiny filament
Foraminifere
Dasycladacean algae
Other algae
Cavities cemented by fibrous calcite "Grossoolith"
Fenestral filling cal.
Wain calcite
Pore filling calcite
Stylolite
Bioturbation
Geopetal structure
Lamination
Wavy
Smooth
Average diamerte of five largest allochneme
Quartz
Grain
Diagenetic
Rock fragments
Rounding
Angular
Subrounded
Rounded
Sorted
Non
Poor
Fair
Well
Total allochemes
Total matrix
Depositional texture
1505 1504 1503 1502 1501 1500 1499 1498 1497 1496 1495 1494 1493 1492 1491 1490 1489 1488 1487 1486 1485 1484 1483
WS PS GS PS PS GS CM PS GS WS WS CM WS PS GS WS GS WS PS PS GS WS
50 30 70 30 70 30 80 20 40 60 95 5 35 65 30 70 60 40 35 65 25 75

Continued

Thin section no.	1507	1506
Allochemes: Intraclast		
Allochemes: Bioclast		
Allochemes: Ooid		
Allochemes: Oncoid		
Allochemes: Pisoid		
Allochemes: Peloid		
Allochemes: Aggregate grain		
Matrix: Micrite		
Matrix: Spary calcite cement		
Matrix: Aspects of cement: One zone fringing		
Matrix: Aspects of cement: Two zones fringing		
Matrix: Aspects of cement: Fringing + Blocky		
Matrix: Aspects of cement: Blocky cement		X
Iron oxide		
Micrite: Recrystallized calcite		
Micrite: Spare		
Dolomite		
Recrystallized allochneme		
Sponge		
Coral		
Bryozoa		
Brachiopod		
Lamellibranch		
Gastropod		
Ostracod		
Crinoid+Echinoid		
Ammonite		
Radiolaria		
Thiny filament		
Foraminifere		
Dasycladacean algae		
Other algae		
Cavities cemented by fibrous calcite "Grossoolith"		
Fenestral filling cal.		
Main calcite		
Pore filling calcite		
Stylolite		
Bioturbation		
Geopetal structure		
Lamination: Wavy		
Lamination: Smooth		
Average diamete of five largest allochneme		
Quartz: Grain		
Quartz: Diagenetic		
Rock fragments		
Rounding: Angular		X
Rounding: Subrounded		
Rounding: Rounded		X
Sorted: Non	X	
Sorted: Poor	X	
Sorted: Fair		X
Sorted: Well		
Total allochemes	15	65
Total matrix	85	34
Depositional textur	WS	PS

Table 4. 6 Results of the Detailed Petrographical Analyses of the Güvercinlik Formation (Stratotype n. 4 and 12)



Continued

Thin section no.
Allochemes
Intraclast
Bioclast
Oold
Oncoid
Pisoid
Peloid
Aggregate grain
Matrix
Micrite
Spary calcite cement
Aspects of cement
One zone fringing
Two zones fringing
Fringing + Blocky
Blocky cement
Iron oxide
Micrite
Recrystallized calcite
Spare
Dolomite
Recrystallized allochteme
Sponge
Coral
Bryozoa
Brachiopod
Lamellibranch
Gastropod
Ostracod
Crinoid+Echinoid
Ammonite
Radiolaria
Thiny filament
Foramnifere
Dasycladacean algae
Other algae
Cavities cemented by fibrous calcite "Grossocilth"
Fenestral filling cal.
Vein calcite
Pore filling calcite
Stylolite
Bioturbation
Geopetal structure
Laminaton
Wavy
Smooth
Average diameter of five largest allochneme
Quartz
Grain
Diagenetic
Rock fragments
Rounding
Angular
Subrounded
Rounded
Sorted
Non
Poor
Fair
Well
Total allochemes
Total matrix
Depositional texture
2354
2353
2352
2351
2350
2349
2348
2347
2346
2345
2328
2327
2326
2325
2324
2323
30
70
20
80
30
70
0
100
35
65
BWS
CM
WS
GS

Table 4. 7 Results of the Detailed Petrographical Analyses of the Lower Limestone subunit of the Nohutalan Formation (Stratotype no. 13).

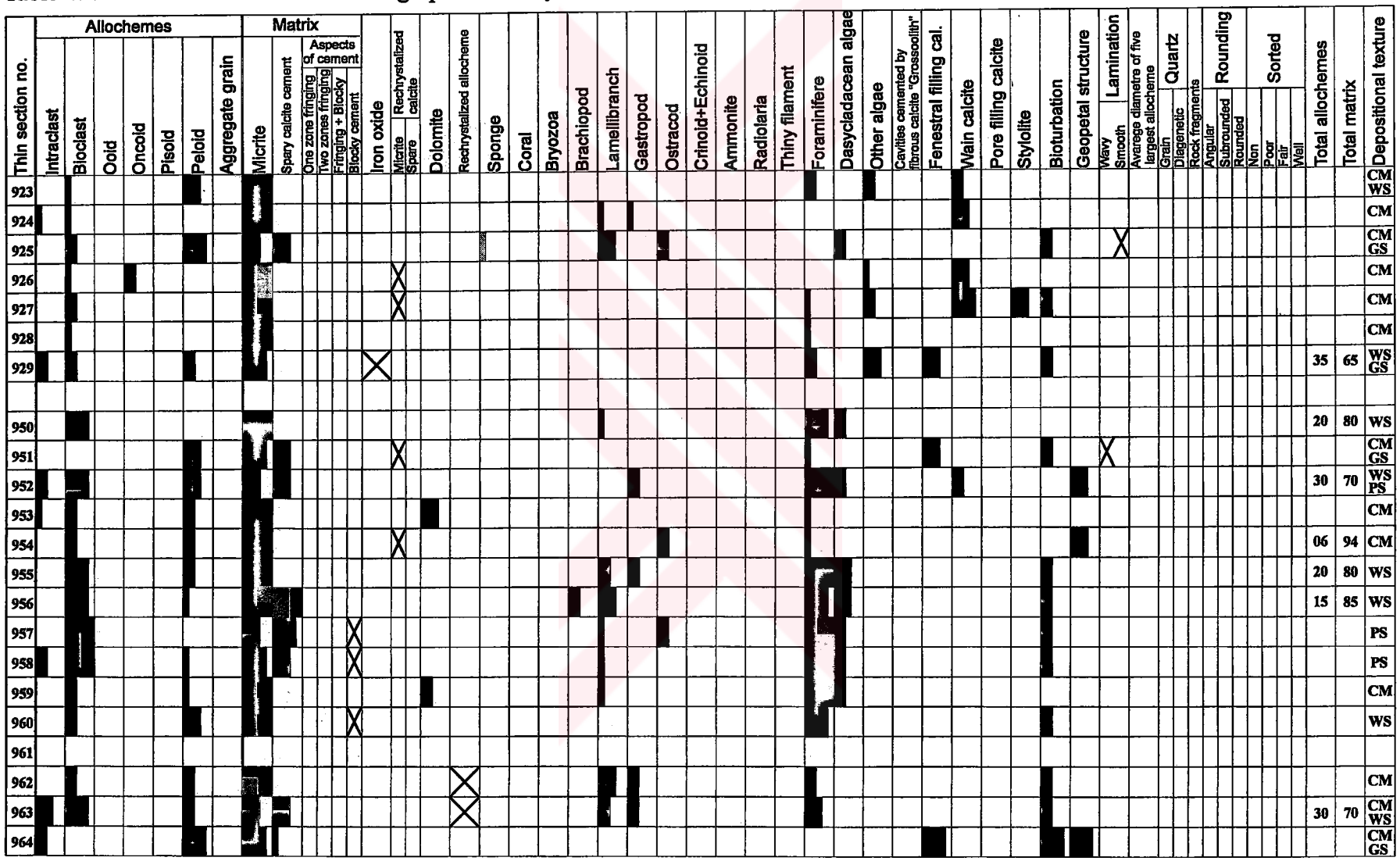
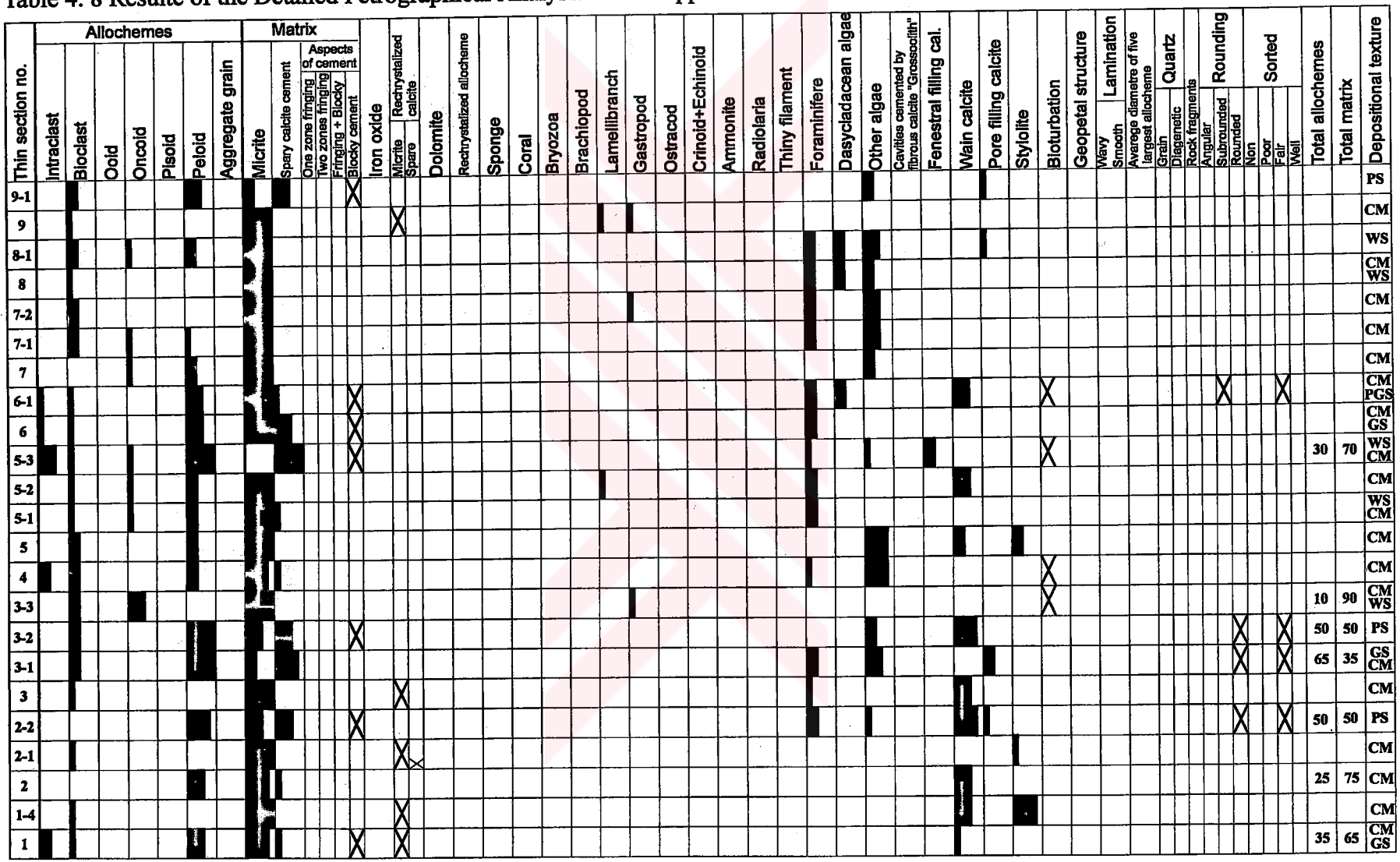


Table 4. 8 Resulte of the Detailed Petrographical Analyses of the Upper Limestone Subunit of the Nohutalan Formation(Stratotype n. 14)



Continued

Thin section no.
Allochemes
Intraclast
Bioclast
Oold
Oncoid
Pisoid
Peloid
Aggregate grain
Matrix
Micrite
Spray calcite cement
Aspects of cement
One zone fringing
Two zones fringing
Fringing + Blocky
Blocky cement
Iron oxide
Micrite
Recrystallized
Spare
Recrystallized calcite
Dolomite
Spongе
Coral
Bryozoa
Brachiopod
Lamellibranch
Gastropod
Ostracod
Crinoid+Echinoid
Ammonite
Radiolaria
Thiny filament
Foraminifere
Dasycladacean algae
Other algae
Cavities cemented by fibrous calcite "Grossocilit"
Fenestral filling cal.
Wain calcite
Pore filling calcite
Stylolite
Bioturbation
Geopetal structure
Lamination
Wavy
Smooth
Average diametre of five largest allochems
Quartz
Grain
Diagenetic
Rock fragments
Rounding
Angular
Subrounded
Rounded
Sorted
Non
Poor
Fair
Well
Total allochemes
Total matrix
Depositional textur
32 WS 30 70
31 WS 12 88
30 CM
29 WS 25 75
28 WS 30 70
27 WS 40 60
26 WS
25 50 50
24 PCM 80 20
23 WS 25 75
22 CM
21 CM
20 WS 30 70
19 CM 20 80
18
17 CM
16 CM
15 CM
14 PS 30 70
13 CM
12 CM GS
11 CM
10 CM

Continued

Thin section no.
Allochemes
intraclast
Bioclast
Oold
Oncoid
Pisoid
Peloid
Aggregate grain
Matrix
Micrite
Spary calcite cement
Aspects of cement
One zone fringing
Two zones fringing
Fringing + Blocky
Blocky cement
Iron oxide
Micrite
Recrystallized
Spare
calcite
Dolomite
Recrystallized allochemo
Sponge
Coral
Bryozoa
Brachiopod
Lamellibranch
Gastropod
Ostracod
Crinoid+Echinoid
Ammonite
Radiolaria
Thiny filament
Foraminifere
Dasycladacean algae
Other algae
Cavities cemented by
fibrous calcite "Grossoilit"
Fenestral filling cal.
Main calcite
Pore filling calcite
Stylolite
Bioturbation
Geopetal structure
Lamination
Wavy
Smooth
Average diameter of five
largest allochemo
Quartz
Grain
Diagenetic
Rock fragments
Rounding
Angular
Subrounded
Rounded
Non
Sorted
Poor
Fair
Well
Total allochemes
Total matrix
Depositional texture
WS
PS
BIS
WS
BIS
CM
CM
WS
WS
PS
CM
GS
WS
PS
PS
PS
GS
BIS
CM
GS
GS
CM
PGS
CM
WS
GS
CM
PS
GS
CM
WS
CM
WS
55
54
53
52
51
50
49
48
47
46
45
44
43
42
41
40
39
38
37
36
35
34
33
50
50
40
40
50
50
40
70
75
65
80
35
85
60
60
50
50
60
30
25
35
20
65
15
>5
>5
>5
>10

Continued

Thin section no.
Allochemes
Intraclast
Bioclast
Ooid
Oncoid
Pisoid
Peloid
Aggregate grain
Matrix
Micrite
Spary calcite cement
Aspects of cement
One zone fringing
Two zones fringing
Fringing + Blocky
Blocky cement
iron oxide
Micrite
Recrystallized calcite
Spare calcite
Dolomite
Recrystalized allochem
Sponge
Coral
Bryozoa
Brachiopod
Lamellibranch
Gastropod
Ostracod
Crinoid+Echinoid
Ammonite
Radiolaria
Thiny filament
Foraminifere
Dasycladacean algae
Other algae
Cavities cemented by fibrous calcite "Grossocilth"
Fenestral filling cal.
Main calcite
Pore filling calcite
Stylolite
Bioturbation
Geopetal structure
Lamination
Wavy
Smooth
Average diameter of five largest allochems
Quartz
Grain
Diagenetic
Rock fragments
Rounding
Angular
Subrounded
Rounded
Sorted
Non
Poor
Fair
Well
Total allochemes
Total matrix
Depositional texture
78 85 15 GS
77 40 60 WS
76 01 99 CM
75 85 15 GS
74 85 15 GS
73 15 85 WS
72 80 20 GS
71 80 20 GS
70 20 80 WS GS
69 15 85 CM
68 85 WS
67 CM
66 BIS CM
65 BIS CM
64 5 95 CM
63 25 75 WS GS
62 15 85 WS
61 12 88 BIS WS
60 15 85 WS
59 BIS WS
58 25 75 WS
57 WS
56 40 60 WS GS

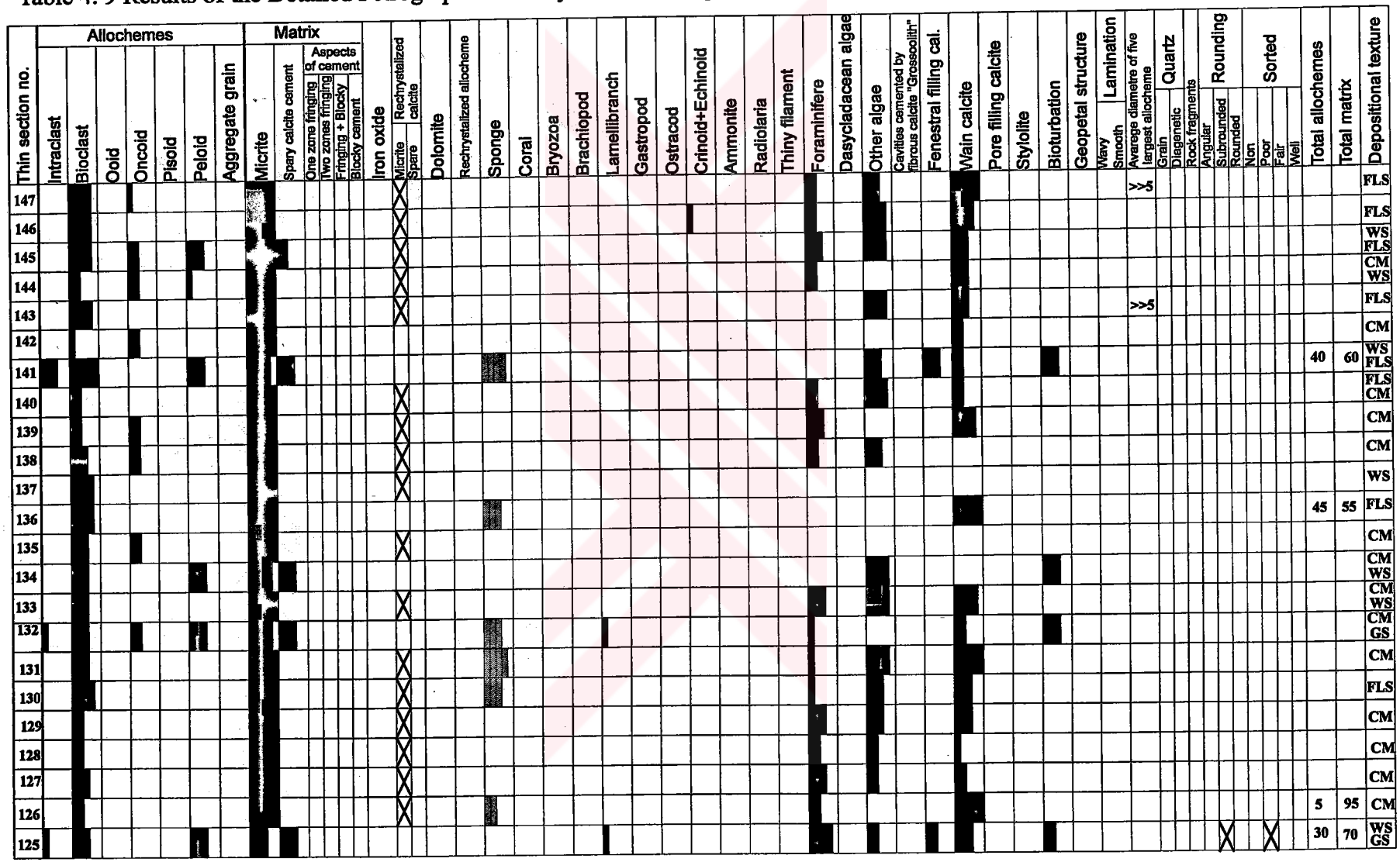
Continued

Thin section no.	101	100	99	98	97	96	95	94	93	92	81	80	89	88	87	86	85	84	83	82	81	80	79
Allochemes: Intraclast																							
Allochemes: Bioclast																							
Allochemes: Ooid																							
Allochemes: Oncoid																							
Allochemes: Pisoid																							
Allochemes: Peloid																							
Allochemes: Aggregate grain																							
Matrix: Micrite																							
Matrix: Spary calcite cement																							
Matrix: Aspects of cement: One zone fringing																							
Matrix: Aspects of cement: Two zones fringing																							
Matrix: Aspects of cement: Fringing + Blocky																							
Matrix: Aspects of cement: Blocky cement			X						X			X			X	X		X	X		X	X	X
Iron oxide																							
Micrite: Recrystalized calcite		X	X																				
Micrite: Spare calcite																							
Dolomite																							
Recrystalized allochteme																							
Sponge																							
Coral																							
Bryozoa																							
Brachiopod																							
Lamellibranch																							
Gastropod																							
Ostracod																							
Crinoid+Echinoid																							
Ammonite																							
Radiolaria																							
Thiny filament																							
Foraminifere																							
Dasycladacean algae																							
Other algae																							
Cavities cemented by fibrous calcite "Grossoolith"																							
Fenestral filling cal.																							
Wain calcite																							
Pore filling calcite																							
Stylolite																							
Bioturbation																							
Geopetal structure																							
Laminaton: Wavy																							
Laminaton: Smooth																							
Average diamete of five largest allochteme																							
Quartz: Gratn																							
Quartz: Diagenetic																							
Rock fragments																							
Rounding: Angular		X			X	X	X	X	X									X			X	X	X
Rounding: Subrounded																X		X	X		X	X	X
Rounding: Rounded																							
Sorted: Non																							
Sorted: Poor		X			X	X	X	X	X										X		X	X	
Sorted: F-air																	X	X					X
Sorted: Well																							
Total allochemes					25				25			50						70	50	35	50	50	
Total matrix					75				75			50						30	50	65	50	50	
Depositional textura	GS	WS	CM	WS	WS	WS	WS	WS	FLS	BIS	BIS	BIS	CM	CM	WS	PS		GS	PS	WS	PS	PS	WS GS

Continued

Thin section no.
Allochemes
Intraclast
Bioclast
Oold
Oncoid
Pisoid
Peloid
Aggregate grain
Matrix
Micrite
Spary calcite cement
Aspects of cement
One zone fringing
Two zones fringing
Fringing + Blocky
Blocky cement
Iron oxide
Micrite
Recrystallized
Spare calcite
Dolomite
Recrystallized allochem
Sponge
Coral
Bryozoa
Brachiopod
Lamellibranch
Gastropod
Ostracod
Crinoid+Echinoid
Ammonite
Radiolaria
Thiny filament
Foraminifere
Dasycladacean algae
Other algae
Cavities cemented by fibrous calcite "Grossoolith"
Fenestral filling cal.
Vein calcite
Pore filling calcite
Stylolite
Bioturbation
Geopetal structure
Lamination
Wavy
Smooth
Average diameter of five largest allochems
Quartz
Grain
Diagenetic
Rock fragments
Rounding
Angular
Subrounded
Rounded
Sorted
Non
Poor
Fair
Well
Total allochemes
Total matrix
Depositional texture
WS PGS
GS PS
CM PGS
CM
PS GS
PS
WS
124
123
122
121
120
119
118
117
116
115
114
113
112
111
110
109
108
107
106
105
104
103
102
20
75
80
25
65
35
60
40
35
65
75
25
>5
>10

Table 4. 9 Results of the Detailed Petrographical Analyses of the Birgi Formation (Stratotype n. 14 and 15)



Continued

| Thin section no. | Allochemes: Intraclast | Bioclast | Ooid | Oncoid | Pisoid | Peloid | Aggregate grain | Matrix: Micrite | Spary calcite cement | Aspects of cement: One zone fringing | Two zones fringing | Fringing + Blocky | Blocky cement | Iron oxide | Micrite: Recrystallized spare calcite | Dolomite | Recrystallized allochneme | Sponge | Coral | Bryozoa | Brachiopod | Lamellibranch | Gastropod | Ostracod | Crinoid+Echinoid | Ammonite | Radiolaria | Thiny filament | Foraminifere | Dasycladacean algae | Other algae | Cavities cemented by fibrous calcite "Grossocilit" | Fenestral filling cal. | Vein calcite | Pore filling calcite | Stylolite | Bioturbation | Geopetal structure | Lamination: Wavy | Lamination: Smooth | Average diameter of five largest allochneme | Quartz: Grain | Quartz: Diagenetic | Rock fragments | Rounding: Angular | Rounding: Subrounded | Rounding: Rounded | Sorted: Non | Sorted: Poor | Sorted: Fair | Sorted: Well | Total allochemes | Total matrix | Depositional texture |
|---|---|---

Continued

| Thin section no. | Allochemes: Intraclast | Bioclast | Ooid | Oncoid | Pisoid | Peloid | Aggregate grain | Matrix: Micrite | Spary calcite cement | Aspects of cement: One zone fringing | Two zones fringing | Fringing + Blocky | Blocky cement | Iron oxide | Micrite: Recrystallized | Micrite: Spare calcite | Dolomite | Recrystallized allochems | Sponge | Coral | Bryozoa | Brachiopod | Lamellibranch | Gastropod | Ostracod | Crinoid+Echinoid | Ammonite | Radiolaria | Thiny filament | Foraminifere | Dasycladacean algae | Other algae | Cavities cemented by fibrous calcite "Grossoolith" | Fenestral filling cal. | Vein calcite | Pore filling calcite | Stylolite | Bioturbation | Geopetal structure | Laminations: Wavy | Laminations: Smooth | Average diameter of five largest allochems | Quartz: Grain | Quartz: Diagenetic | Rock fragments | Rounding: Angular | Rounding: Subrounded | Rounding: Rounded | Sorted: Non | Sorted: Poor | Sorted: Fair | Sorted: Well | Total allochemes | Total matrix | Depositional texture |
|---|---|---

Continued

Thin section no.
Allochemes
Intraclast
Bioclast
Ooid
Oncoid
Pisoid
Peloid
Aggregate grain
Matrix
Micrite
Spary calcite cement
Aspects of cement
One zone fringing
Two zones fringing
Fringing + Blocky
Blocky cement
Iron oxide
Micrite
Recrystallized calcite
Spare calcite
Dolomite
Recrystallized allochem
Sponge
Coral
Bryozoa
Brachiopod
Lamellibranch
Gastropod
Ostracod
Crinoid+Echinoid
Ammonite
Radiolaria
Thiny filament
Foraminifere
Dasycladacean algae
Other algae
Cavities cemented by fibrous calcite "Grossoolith"
Fenestral filling cal.
Vein calcite
Pore filling calcite
Stylolite
Bioturbation
Geopetal structure
Lamination
Wavy
Smooth
Average diameter of five largest allochemes
Quartz
Grain
Diagenetic
Rock fragments
Rounding
Angular
Subrounded
Rounded
Sorted
Non
Poor
Fair
Well
Total allochemes
Total matrix
Depositional texture
CM
FLS
225
224
223
222
221
220
219
218
217
216
215
214
213
212
211
210
209
208
207
206
205
204
203

Continued

Thin section no.
Allochemes
Intraclast
Bioclast
Ooid
Oncoid
Pisoid
Peloid
Aggregate grain
Matrix
Micrite
Spary calcite cement
Aspects of cement
One zone fringing
Two zones fringing
Fringing + Blocky
Blocky cement
Iron oxide
Micrite
Recrystallized
Spare calcite
Dolomite
Recrystallized allochems
Sponge
Coral
Bryozoa
Brachiopod
Lamellibranch
Gastropod
Ostracod
Crinoid+Echinoid
Ammonite
Radiolaria
Thiny filament
Foraminifere
Dasycladacean algae
Other algae
Cavities cemented by fibrous calcite "Grossocilin"
Fenestral filling cal.
Vein calcite
Pore filling calcite
Stylolite
Bioturbation
Geopetal structure
Lamination
Wavy
Smooth
Average diameter of five largest allochems
Quartz
Grain
Diagenetic
Rock fragments
Rounding
Angular
Subrounded
Rounded
Sorted
Non
Poor
Fair
Well
Total allochemes
Total matrix
Depositional texture
248 247 246 245 244 243 242 241 240 239 238 237 236 235 234 233 232 231 230 229 228 227 226
CM CM CM CM WS CM WS GS PS CM FLS CM PS GS PGS FLS WS CM WS CM WS FLS WS FLS CM FLS CM WS FLS CM FLS
30 70
>4 >5 >5

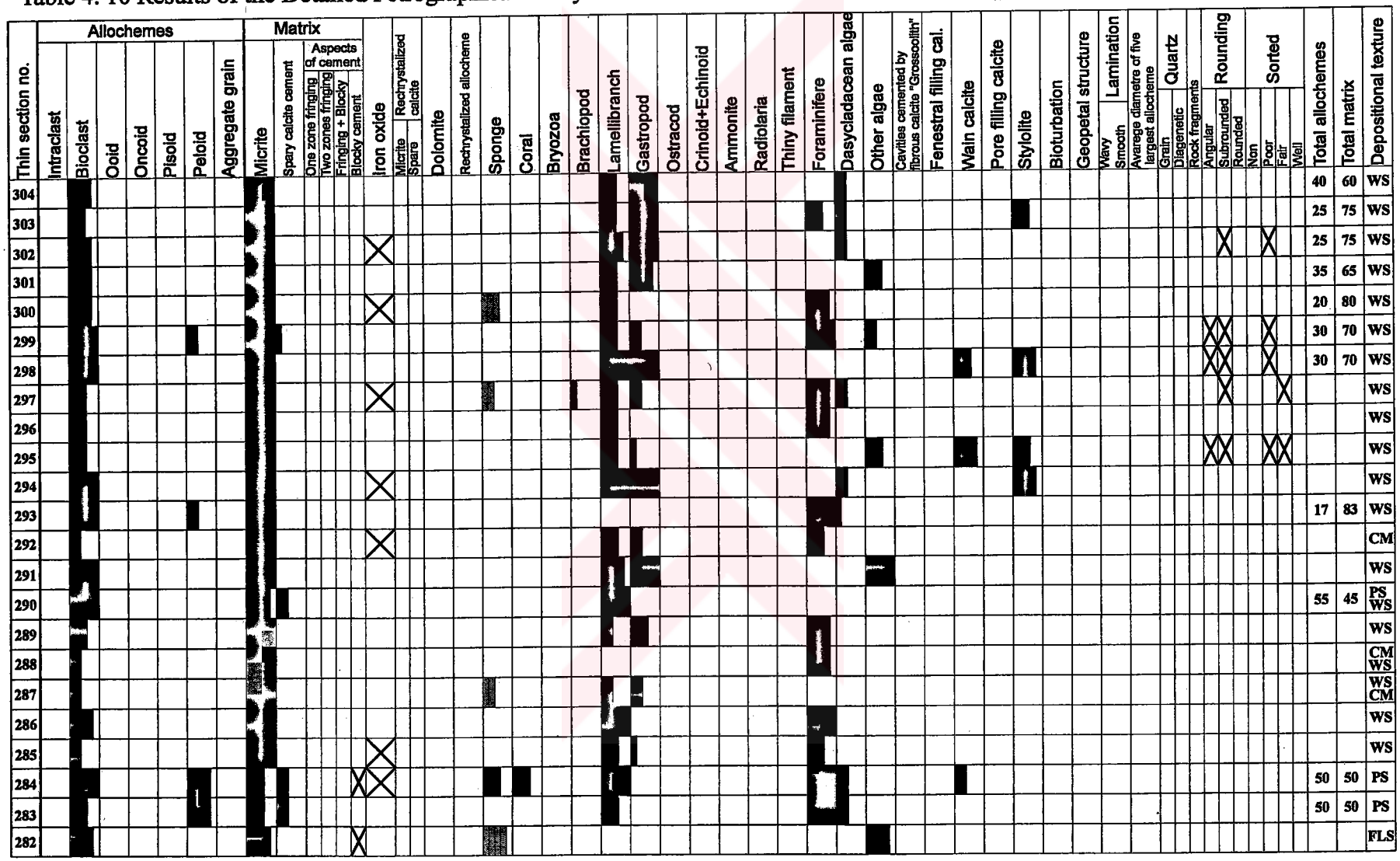
Continued

Thin section no.
Allochemes
Intraclast
Bioclast
Oöid
Oncoid
Pisoid
Peloid
Aggregate grain
Matrix
Micrite
Spary calcite cement
Aspects of cement
One zone fringing
Two zones fringing
Fringing + Blocky
Blocky cement
Iron oxide
Micrite
Recrystallized
Spare calcite
Dolomite
Recrystallized allochneme
Sponge
Coral
Bryozoa
Brachiopod
Lamellibranch
Gastropod
Ostracod
Crinoid+Echinoid
Ammonite
Radiolaria
Thiny filament
Foraminifere
Dasycladacean algae
Other algae
Cavities cemented by fibrous calcite "Grossoilit"
Fenestral filling cal.
Main calcite
Pore filling calcite
Stylolite
Bioturbation
Geopetal structure
Lamination
Wavy
Smooth
Average diameter of five largest allochneme
Quartz
Grain
Diagenetic
Rock fragments
Rounding
Angular
Subrounded
Rounded
Sorted
Non
Poor
Fair
Well
Total allochemes
Total matrix
Depositional texture
271 CM WS
270 CM WS
269 CM WS
268 CM
267 89 11 WS
266
265 CM WS
264 CM
263 CM
262 CM
261 CM WS
260 WS PGS
259 FLS WS
258 CM
257 FLS
256 FLS
255 CM WS
254 WS
253
252 65 35 GS
251 WS FLS
250 CM
249 CM

Continued

Thin section no.
Allochemes
Intraclast
Bioclast
Ooid
Oncoid
Pisoid
Peloid
Aggregate grain
Matrix
Micrite
Spary calcite cement
Aspecs of cement
One zone fringing
Two zones fringing
Fringing + Blocky
Blocky cement
Iron oxide
Micrite
Recrystallized calcite
Spare calcite
Dolomite
Recrystallized allochem
Sponge
Coral
Bryozoa
Brachiopod
Lamellibranch
Gastropod
Ostracod
Crinoid+Echinoid
Ammonite
Radiolaria
Thiny filament
Foraminifere
Dasycladacean algae
Other algae
Cavities cemented by fibrous calcite "Grossoilit"
Fenestral filling cal.
Wain calcite
Pore filling calcite
Stylolite
Bioturbation
Geopetal structure
Lamination
Wavy
Smooth
Average diameter of five largest allochems
Quartz
Grain
Diagenetic
Rock fragments
Rounding
Angular
Subrounded
Rounded
Sorted
Non
Poor
Fair
Wall
Total allochemes
Total matrix
Depositional textur
282
281
280
279
278
277
276
275
274
273
272
FLS
CM WS
CM WS
CM WS
CM
CM WS
CM WS
CM WS
CM WS
CM
WS

Table 4. 10 Results of the Detailed Petrographical Analyses of the Limestone Subunit of the Aktepe Formation (Stratotype n 14)



Continued

Thin section no.
Allochemes
Intraclast
Bioclast
Ooid
Oncoid
Pisoid
Peloid
Aggregate grain
Matrix
Micrite
Spary calcite cement
Aspects of cement
One zone fringing
Two zones fringing
Fringing + Blocky
Blocky cement
iron oxide
Micrite
Recrystallized calcite
Spare calcite
Dolomite
Recrystallized allochem
Sponge
Coral
Bryozoa
Brachiopod
Lamellibranch
Gastropod
Ostracod
Crinoid+Echinoid
Ammonite
Radiolaria
Thiny filament
Foraminifere
Dasycladacean algae
Other algae
Cavities cemented by fibrous calcite "Grassocalth"
Fenestral filling cal.
Vein calcite
Pore filling calcite
Stylolite
Bioturbation
Geopetal structure
Lamination
Wavy
Smooth
Average diameter of five largest allochems
Quartz
Grain
Diagenetic
Rock fragments
Rounding
Angular
Subrounded
Rounded
Sorted
Non
Poor
Fair
Well
Total allochemes
Total matrix
Depositional texture
327 326 325 324 323 322 321 320 319 318 317 316 315 314 313 312 311 310 309 308 307 306 305
80 80 80 25 35 50 50 50 40 20 80 20 30
20 20 20 75 65 50 50 50 60 80 80 70
GS GS GS FLS WS WS WS WS WS WS PGS CM WS WS WS WS WS PS FLS FLS WS WS WS WS WS

Continued

Thin section no.	330	329	320
Allochemes: Intraclast			
Allochemes: Bioclast			
Allochemes: Oold			
Allochemes: Oncoid			
Allochemes: Pisoid			
Allochemes: Peloid			
Allochemes: Aggregate grain			
Matrix: Micrite			
Matrix: Spary calcite cement			
Matrix: Aspects of cement: One zone fringling			
Matrix: Aspects of cement: Two zones fringling			
Matrix: Aspects of cement: Fringling + Blocky			
Matrix: Aspects of cement: Blocky cement			
Iron oxide			
Micrite: Recrystallized			
Spare calcite			
Dolomite			
Recrystallized allochteme			
Sponge			
Coral			
Bryozoa			
Brachiopod			
Lamellibranch			
Gastropod			
Ostracod			
Crinoid+Echinoid			
Ammonite			
Radiolaria			
Thiny filament			
Foraminifere			
Dasycladacean algae			
Other algae			
Cavities cemented by fibrous calcite "Grossoolith"			
Fenestral filling cal.			
Wain calcite			
Pore filling calcite			
Stylolite			
Bioturbation			
Geopetal structure			
Laminaton: Wavy			
Laminaton: Smooth			
Average diamete of five largest allochteme	75	75	80
Quartz: Grain	25	25	20
Quartz: Diagenetic	PS	PS	GS
Rock fragments			
Rounding: Angular			
Rounding: Subrounded			
Rounding: Rounded			
Sorted: Non			
Sorted: Poor			
Sorted: Fair			
Sorted: Well			
Total allochemes			
Total matrix			
Depositional textur			

EXPLANATIONS FOR PLATES 1 to 87

PLATE 1

Fig. 1. Thin-section photomicrograph of oolitic, bioclastic grainstone microphacies, in the Gerence Formation. Sample no. 1082, x16.6.

Fig. 2. Thin-section photomicrograph of oolitic, bioclastic, grainstone microphacies, in the Gerence Formation. Sample no. 1083, x17.

Fig. 3. Thin-section photomicrograph of thin pelecypod and Radiolaria-bearing wackestone microphacies, in the Gerence Formation. Sample no. 1084, x16.7.

Fig. 4. Thin-section photomicrograph of oolitic, bioclastic grainstone microphacies, in the Gerence Formation. Sample no. 1084, x32.8.

Fig. 5. Thin-section photomicrograph of sandy, silty limestone, in the Gerence Formation. Sample no.1096, x22.

Fig. 6. Thin-section photomicrograph of ammonite bearing limestone, in the Laleköy member of the Camibogazı Formation. Sample no. 1140, x22.7.

Fig. 7. Thin-section photomicrograph of Radiolaria-bearing wackestone microphacies, in the Gerence Formation. Sample no. 110, x16.

PLATE 2

Fig. 1. Thin-section photomicrograph of bioclastic intraclastic pelledal grainstone microphacies, in the Laleköy member of the Camibogazı Formation. Sample no. 1154, x16.4.

Fig. 2. Thin-section photomicrograph of thin pelecypod, crinoidal fragment-bearing pelledal grainstone to wackestone microphacies, in the Laleköy member of the Camiboğazı Formation. Sample no. 1139, x18.6.

Fig. 3. Thin-section photomicrograph of bioclastic intraclastic pelledal grainstone microphacies, in the Laleköy member of the Camibogazı Formation. Sample no. 1159, x16.4.

Fig. 4. Thin-section photomicrograph of thin pelecypod-bearing laminated pelledal grainstone microphacies, in the Laleköy member of the Camibogazı. Sample no. 1179, x17.7.

Fig. 5. Thin-section photomicrograph of grainstone microphacies including coarse grains derived from organic build up formations, cemented with the zone radial and central blocky cement. In the upper part of the Laleköy member of the Camibogazı Formation. Sample no. 1194, x17.6.

Fig. 6. Thin-section photomicrograph of sponge-bearing algal biostromal limestones with large infra-frame cavity cemented by blocky cement, in the upper part of the Laleköy member of the Camibogazı Formation. Sample no. 1193, x19.

Fig. 7. Thin-section photomicrograph of sponge and algae-bearing biostromal lime stone, in the upper part of the Laleköy member of the Camibogazı Formation. Sample no. 1199, x18.

PLATE 3

Fig. 1. Thin section photomicrograph of algal crust, and sponge-bearing, organic build-up formation, in the upper part of the Laleköy Formation.
Sample no. 1181, x20.

Fig. 2. *Cayeuxia* sp.
Sample no. 1156, x53.7.

Fig. 3. *Tubiphytes* sp.
Sample no. 1206, x41.6.

Fig. 4. *Solenelmia (= Dictyocoelia) manon manon*
Sphinctozoa, Porifera (Ladinian)
Sample no. 1196, x18.2.

Fig. 5. *Baccinella ordinata.*
Sample no. 1289, x17.2.

Fig. 6. *Tubiphyes* sp.
Sample no. 1152, x143.

Fig 7. *Baccinella ordinata*
Sample no. 1210, x17.

PLATE 4

Fig. 1. *Microtubus babai*
Sample no. 1216, x16.

Fig. 2. Coral
Sample no. 1214, x21.

Fig. 3. *Solenolmia* (= *Dictyocoelia*) manon manon
Sample no. 1300, x13.4.

Fig. 4. *Celyphia* sp.
Sample no. 1196, x17.

Fig. 5. Inozoid sponge
Sample no. 1339, x16.6.

Fig. 6. *Ceyenzia* sp.
Sample no. 1197, x32.4.

Fig. 7. Inozoid sponge
Sample no. 1340, x16.

PLATE 5

Fig. 1. Coral
Sample no. 1367, x23.

Fig. 2. Thin-section photomicrograph of fecal pellet including small involutinids, in the Hanaylı member of the Camiboğazı formation.
Sample no. 1480, x42.

Fig. 3. Prostamate algae Cyanophicae
Sample no. 1438, x23.

Fig. 4. Coral
Sample no. 1417, x18.

Fig. 5. Bryozoa
Sample no. 1419, x16.

PLATE 6

Fig. 1. *Eostaffella postmosquensis*
Sample no. 1900, thin section no. 1900; nearly axial view; x154.

Fig. 2. *Eosteffella chusovensis*
Sample no. 2153, thin section no. 2153; axial section, x158.

Fig. 3. *Millerella* sp.
Sample no. 2153, thin section no. 2153; nearly axial view, x316.

Fig. 4. *Ozavainella* sp.
Sample no. 2150, thin section no. 2150; nearly axial view, x106.

Fig. 5. *Pseudostaffella antiqua*
Sample no. 1901, thin section no. 1901; equatorial view, x70.

Fig. 6. 7. *Pseudosteffella sofronizkyi*
6. Sample no. 1905, thin section no. 1905; nearly axial oblique view, x152.5.
7. Sample no. 1914, thin section no. 1914; nearly axial oblique view, x148.

Fig. 8. *Endothyra bradyi*
Sample no. 1949, thin section no. 1949; nearly axial section, x82.

Fig. 9. *Endothyra bashkirica*
Sample no. 2150, thin section no. 2150; axial oblique view, x164.

PLATE 7

Fig. 1. *Bradyina cribrostomata*
Sample no. 1906, thin section no. 1906; equatorial oblique view, x49.

Fig. 2. *Bradyina concinna*
Sample no. 2151, thin section no. 2151 YD; nearly equatorial section, x32.

Fig. 3. *Globivalvulina bulloides*
Sample no. 2153, thin section no. 2153; equatorial oblique, x161.

Fig. 4. *Endotaxis* sp.
Sample no. 1904, thin section no. 1904; nearly longitudinal view, x156.

Fig. 5. *Eolasiodiscus donbassicus*
Sample no. 2150, thin section no. 2150; nearly axial view, x117.

Fig. 6. *Climacammina* sp.
Sample no. 2150, thin section no. 2150; longitudinal oblique view, x128.

Fig. 7. *Turrispiroides multivolutus*
Sample no. 1904, thin section no. 1904; nearly axial view, x306.

Fig. 8. *Planoendothyra aljoutoviva*
Sample no. 2159, thin section no. 2159; nearly axial view, x151.

PLATE 8

Fig. 1. *Earlandia amplimural*
Sample no. 1193, thin section no. 1193; nearly longitudinal view; x191.9.

Fig. 2, 3, 4. *Earlandia tintiniformis.*
Sample no. 1183, thin section no. 1183; 2, 3 nearly longitudinal view, 4 longitudinal section, 2: x85.7, 3: x103, 4: x87.3.

Fig. 5, 6, 9, 10. *Endoteba ex. gr. obturata.*
Sample no. 1172, thin section no. 1172; nearly axial oblique view, x222.
Sample no. 1153, thin section no. 1153; nearly axial view, x110.
Sample no. 1340, thin section no. 1340; equatorial oblique view, x128.6.
Sample no. 1186, thin section no. 1186; equatorial oblique view, x162

Fig. 7. *Earlandlia gracilis.*
Sample no. 1706, thin section no. 1706; nearly longitudinal view, x116.

Fig. 8. *Endoteba controversa.*
Sample no. 1115, thin section no. 1115-B; axial view, x131.3.

PLATE-9

Fig. 1. *Entoteba* ex gr. *obturata*
Sample no. 1146, thin section no. 1146; nearly equatorial view. x227.3.

Fig. 2, 3, 7. *Endotebanella pentacamerata*
2. Sample no. 1115, thin section no. OKL-5; longitudinal view, x26.9.
3. same sample, same individual, x100.
7. Sample no. 1120, thin section no. 1120; longitudinal oblique view, x114

Fig. 4-6 ,8. *Endoteba badoxi*
4. Sample no. 1225, thin section no. 1225; axial oblique view, x170.
5. Sample no. 1364, thin section no. 1364; oblique view, x118.9.
6. Sample no. 1203, thin section no. 1203; nearly equatorial view, x218.4.
8. Sample no. 1307, thin section no. 1307; equatorial oblique view, x138.8.

PLATE-10

Fig. 1. *Endotebanella kocaeliensis*
Sample no. 1268, thin section no. 1268; equatorial oblique view of first stage, x183.6.

Fig. 2. *Endotebinella* sp. A
Sample no. 1120, thin section no. 1120; nearly longitudinal view, x77.

Fig. 3. *Endotebinella* sp. B
Sample no. 1135, thin section no. 1135 B; nearly longitudinal view, x48.8.

Fig. 4. *Endotebanella pentacamerata*
Sample no. 1352, thin section no. 1352; nearly longitudinal view of second stage, x66.5.

Fig. 5-7. *Endotebanella* sp. C
5. Sample no. 1141, thin section no. 1141; longitudinal view of second stage, x130.4.
6. Sample no. 1154, thin section no. 1154; longitudinal oblique view of second stage, x64.4.
7. Sample no. 1135, thin section no. 1135-B; longitudinal oblique view of second stage, x59.

Fig. 8-10. *Endotebanella* sp.
8. Sample no. 1157, thin section no. 1157; longitudinal oblique view of second stage, x49.6.
9. Sample no. 1145, thin section no. 1145; longitudinal oblique view of second stage, x113.3.
10. Sample no. 1430, thin section no. 1430; nearly longitudinal view of second stage, x75.

PLATE-11

Fig. 1-9. *Endotebanella* spp.
1. Sample no. 1184, thin section no. 1184; longitudinal oblique view, x89.3.
2. Sample no. 1196, thin section no. 1196; longitudinal oblique view of second stage, x109.9.
3. Sample no. 1229, thin section no. 1229; nearly longitudinal view, x169.
4. Sample no. 1135, thin section no. 1135; longitudinal oblique view of second stage, x145.8.
5. Sample no. 1436, thin section no. 1436; longitudinal section of second stage, x42.2.
6. Sample no. 1296, thin section no. 1296; longitudinal view, x65.
7. Sample no. 1350, thin section no. 1350; longitudinal oblique view of second stage, x60.
8. Sample no. 1347, thin section no. 1347; longitudinal view of second stage, x51,5.
9. Sample no. 1167, thin section no. 1167; longitudinal oblique of second stage view, x44.3.

PLATE-12

Fig. 1-3. *Endotebanella* sp. Or *Ammobaculites* sp.

1. Sample no. 1311, thin section no. 1311; longitudinal view of second stage, x113.6.
2. Sample no. 1304, thin section no. 1304; longitudinal oblique view of second stage, x47.8.
3. Sample no. 1411, thin section no. 1411; longitudinal oblique view of second stage, x46,5.

Fig. 4, 6-9. *Endotriada kuepperi*

4. Sample no. 1135, thin section no. 1135; nearly equatorial view, x153.4.
5. Sample no. 1800, thin section no. 1800-A; nearly equatorial view, x178.2.
6. Sample no. 1802, thin section no. 1802-A; equatorial oblique view, x145.5.
7. Sample no. 1806, thin section no. 1806A; equatorial oblique view, x190.6.
8. Sample no. 1806, thin section no. 1806B; nearly axial view, x102.1.

Fig. 5. *Endotriadella* spp.

Sample no. 1229, thin section no. 1229; nearly longitudinal view, x88.6.

PLATE-13

Fig. 1-5, 7-9. *Endotriada* spp.

1. Sample no. 1425, thin section no. 1425; nearly equatorial view, x181.4.
2. Sample no. 1170thin section no. 1170; nearly axial view; x211.
3. Sample no. 1203, thin section no. 1203; nearly axial view, x221.9.
4. Sample no. 1135, thin section no. 1135; nearly equatorial view, x225.8.
5. Sample no. 1152, thin section no. 1152; equatorial oblique view, x108.

Fig. 6. *Endotriadella* spp

Sample no. 1135, thin section no. 1135; nearly longitudinal view of second stage, x168.4.

Fig. 7-9. *Endotriada* spp.

7. Sample no. 1172, thin section no. 1172; nearly equatorial view, x180.3.
8. Sample no. 1802, thin section no. 1802A; equatorial view, x145.6.
9. Sample no. 1809, thin section no. 1809 A; nearly equatorial view, x171.9.

PLATE-14

Fig. 1, 4, 7. *Endotriada* spp.

1. Sample no. 1802, thin section no. 1802A; equatorial view, x173.4.
4. Sample no. 1806, thin section no. 1806; nearly equatorial view, x158.7.
7. Sample no. 1806B, thin section no. 1806B; nearly equatorial view, x138.5.

Fig. 2-3, 5-6, 8-9. *Endotriadella wirzi.*

2. Sample no. 1236, thin section no. 1236; longitudinal view, x88.3.
3. Sample no. 1256, thin section no. 1256; longitudinal view, x91.6.
5. Sample no. 1809hin-section no. 1809A; nearly equatorial view, x234.4. cutting first stage and two chamber of second stage
6. Sample no. 1809, thin section no. 1809A; nearly longitudinal view, x97.6.
8. Sample no. 1809, thin section no. 1809A; longitudinal oblique view cutting first stage and two chamber of second stage, x103.5.
9. Sample no. 1809, thin section no. 1809A; longitudinal oblique view of first stage and firs four chamber of second stage, x100.

PLATE 15

Figs. 1-6 *Endotriadella wirzi*

1. sample no. 1809, thin section no. 1809; longitudinal oblique view of second stage; x125.
2. sample no. 1809, thin section no. 1809B; longitudinal oblique view of second stage; x96.5.
3. sample no. 1809, thin section no.1809B; longitudinal oblique view, cutting first stage; x169.
4. Sample no. 1809, thin section no. 1809B; transversal view of a globular chamber of second stage view, x229.4.
5. Sample no. 1809, thin section no. 1809B; transversal view of a globular chamber of second stage, x217.9.
6. Sample no. 1809, thin section no. 1809B; longitudinal view, x95.

Figs. 7-8, 11. *Endotriadella* aff. *virzi*

7. sample no. 1803, thin section no. 1803B; longitudinal view, x.
8. sample no. 1803, thin section no. 1803B; detailed view of first stage, x151,7.
11. Sample no. 1803, thin section no. 1803B, x270.

Fig. 9, 10. *Endotriadella* spp.

9. Sample no. 1227, thin section no. 1227; longitudinal oblique view of second stage, x189.3.
10. Sample no. 1185, thin section no. 1185; longitudinal oblique view of second stage, x211.3.

PLATE-16

Fig. 1, 2, 3, 4. *Endotriadella* spp.

1. Sample no. 1194, thin section no. 1194; longitudinal oblique view of second stage, x228.5.
2. Sample no. 1282, thin section no. 1282; longitudinal view, x123.
3. Sample no. 1283, thin section no. 1283; longitudinal oblique view of second stage, x148.
4. Sample no. 1283, thin section no. 1283; longitudinal oblique view of second stage, x296.

Fig. 5-6. *Reophax* sp. A

5. Sample no. 1151, thin section no. 1151; nearly longitudinal view, x43.
6. Sample no. 1210, thin section no. 1210; nearly longitudinal view, x200.

Fig. 7, 10. *Reophax* sp. B

7. Sample no. 1181, thin section no. 1181; longitudinal view, x44.
10. Sample no. 1168, thin section no. 1168; nearly longitudinal view, x83,7.

Fig. 8, 9, *Reophax* sp. C

8. Sample no. 1191, thin section no. 1191; longitudinal oblique view, x78,5.
9. Sample no. 1180, thin section no. 1180, x58,8.

PLATE-17

Fig. 1. *Reophax* sp. B
Sample no. 1156, thin section no. 1156; nearly longitudinal view, x98,8.

Fig. 2, 4-6 R*eophax* sp. C
2. Sample no. 1159, thin section no. 1159; longitudinal view, x58.
4. Sample no. 1231, thin section no. 1231; nearly longitudinal view, x.
5. Sample no. 1229, thin section no. 1229; longitudinal view, x106.
6. Sample no. 1211, thin section no. 1211; longitudinal oblique view, x64,7.

Fig. 3. *Reophax* sp. D
Sample no. 1159, thin section no. 1159; longitudinal view, x46.

Fig. 7-9. *Reophax* sp. E
7. Sample no. 1203, thin section no. 1203; longitudinal view, x115.
8. Sample no. 1329, thin section no. 1329; nearly longitudinal view, x56.
9 Sample no. 1193thin section no. 1193; nearly longitudinal view, x70.

PLATE-18

Fig. 1. *Reophax* sp. E
Sample no. 1455, thin section no. 1455; longitudinal view, x53.

Fig. 2-3, *Reophax* spp.
2. Sample no. 1216, thin section no. 1216; longitudinal view, x52.
3. Sample no. 1709, thin section no. 1709; nearly longitudinal view, x40.

Fig. 4. *Glomogallerium gazdzickli*
Sample no. 1139, thin section no. 1139; oblique view, x132.4.

Fig. 5. *Glomogallerium mlavicensis.*
Sample no. 1115, thin section no. 1115; transversal oblique view, x359.

Fig. 6. *Ammobaculites* ? sp.
Sample no. 1153, thin section no. 1153; longitudinal oblique view, x132.

Fig. 7. *Trochammina* cf. *almtalensis*
Sample no. 737, thin section no. 737; nearly axial view, x137.8

Fig. 8-10. *Trochammina jaunensis*
8. Sample no. 1809, thin section no. 1809B; nearly axial view, x81.8.
9. Sample no. 1809, thin section no. 1809A; nearly axial view, x243.2.
10. Sample no. 1619, thin section no. 1619; nearly axial view, x253.

PLATE-19

Fig. 1, 4-10. *Trochammina spp.*
1. Sample no. 1809, thin section no. 1809A; nearly axial view, x183.
4. Sample no. 1622, thin section no. 1622; longitudinal view, x177.
5. Sample no. 1118, thin section no. 1118; transversal view, x192.3.
6. Sample no. 1123, thin section no. 1123; nearly longitudinal view, x195.6.
7. Sample no. 2111, thin section no. 2111; nearly longitudinal view, x178.
8. Sample no. 2109, thin section no. 2109B; nearly longitudinal view, x197.
9. Sample no. 2103, thin section no. 2103B; transversal view, x138.
10. Sample no. 2110, thin section no. 2110B; transversal view, x178.

Fig. 2-3. *Endotrida tyrrhenica*
2. Sample no. 2105, thin section no. 2105a; equatorial view, x184.
3. Sample no. 2111, thin section no. 2111A; nearly equatorial view, x204.

PLATE-20

Fig. 1-7. "T*extularia" n.* Sp.
1. Sample no. 1150, thin section no. 1150; nearly longitudinal view, x89.8.
2. Sample no. 1150, thin section no. 1150; nearly longitudinal view, x165.
3. Sample no. 1285, thin section no. 1285; longitudinal oblique view, x77.
4. Sample no. 1152, thin section no. 1152; longitudinal oblique view, x116.
5. Sample no. 1160, thin section no. 1160; oblique view, x162.
6. Sample no. 1170, thin section no. 1170; longitudinal oblique view, x88.9.
7. Sample no. 767, thin section no. 767; nearly longitudinal view, x84.3.

Fig. 8-9. *Endoteba controversa*
8. Sample no. 785, thin section no. 785; nearly equatorial view, x257.1.
9. Sample no. 765, thin section no. 765; equatorial view, x116.

PLATE-21

Fig. 1-9. *Gandinella falsolfriedli*
1. Sample no. 1860; thin section no. 1860, x114.
2. Sample no. 1832; thin section no. 1832, x132.
3. Sample no. 1832; thin section no. 1832, x162.
4. Sample no. 1853; thin section no. 1853, x200.
5. Sample no. 1853; thin section no. 1853, x181.8.
6. Sample no. 1853; thin section no. 1853, x175.4.
7. Sample no. 1853; thin section no. 1853, x277.7.
8. Sample no. 1833; thin section no. 1833, x165.
9. Sample no. 1728; thin section no. 1728, x181.

PLATE-22

Fig. 1-6. *Gandinella* sp. aff. G. *falsofriedli*
1. Sample no. 1438; thin section no. 1438, x120.
2. Sample no. 1473; thin section no. 1473, x123.
3. Sample no. 1476; thin section no. 1476, x168.
4. Sample no. 1491; thin section no. 1491, x159.
5. Sample no. 1498; thin section no. 1498, x72.
6. Sample no. 1406; thin section no. 1406, x.143.6.

Fig. 7-10. *Glomospirella rosetta*
7. Sample no. 1853; thin section no. 1853, x169.5.
8. Sample no. 1853; thin section no. 1853, x178.6.
9. Sample no. 1853; thin section no. 1853, x136.9.
10. Sample no. 1853; thin section no. 1853, x140.8.

PLATE-23

Fig. 1-4, 7. *Glomospirella* sp. Aff. G. *Rosetta*
1. Sample no. 1499; thin section no. 1499, x94.
2. Sample no. 1472; thin section no. 1472, x177.
3. Sample no. 1469; thin section no. 1469, x120.
4. Sample no. 1490; thin section no. 1490, x114.
7. Sample no. 1473; thin section no. 1473, x100.

Fig. 5-6, 8-9. *Gandinella* sp.
5. Sample no. 1853; thin section no. 1853, x142.9.
6. Sample no. 1725; thin section no. 1725, x255.
7. Sample no. 1725; thin section no. 1725, x183.
8. Sample no. 1725; thin section no. 1725, x181.

PLATE-24

Fig. 1-4. *Glomospira densa*
1. Sample no. 1134; thin section no. 1134, x84.7.
2. Sample no. 1134; thin section no. 1134, x85.5.
3. Sample no. 1134; thin section no. 1134, x89.2.
4. Sample no. 1134; thin section no. 1134, x74.5.

Fig. 5-6. *Glomospira praedensa*
5. Sample no. 737; thin section no. 737, x286.5.
6. Sample no. 737; thin section no. 737, x275.

Fig. 8-9. *Glomospira* sp.
8. Sample no. 1841; thin section no. 1841, x125.
9. Sample no. 1831; thin section no. 1831, x126.

PLATE-25

Fig. 1-2. *Glomospirella grandis*?
1. Sample no. 1115; thin section no. 1115-C, x162.6.
2. Sample no. 1123; thin section no. 1123, x301.5.

Fig. 3. *Glomospirella* n. Sp.
Sample no. 1507; thin section no. 1507, x77.1.

Fig. 4, 6, 9. *Glomospirella* sp. A
4. Sample no. 584; thin section no. 584, x135.
6. Sample no. 1850; thin section no. 1850, x114.
9. Sample no. 1832; thin section no. 1832, x110.

Fig. 5, 7-8. *Glomospirella* spp.
5. Sample no. 1749; thin section no. 1750, x120.
7. Sample no. 1730; thin section no. 1730, x120.
8. Sample no. 1725; thin section no. 1725, x178.

PLATE-26

Fig. 1-3. *Glomospirella spp.*
1. Sample no. 1853; thin section no. 1853, x222.2.
2. Sample no. 1722; thin section no. 1722, x145.
3. Sample no. 1719; thin section no. 1719, x123.

Fig. 4-8, 10. *Glomospirella gr. expensa.*
4. Sample no. 1834; thin section no. 1834, x141.
5. Sample no. 1841; thin section no. 1841, x147.
6. Sample no. 1845; thin section no. 1845, x171.
7. Sample no. 1832; thin section no. 1832, x114.
8. Sample no. 1841; thin section no. 1841, x188.
10. Sample no. 1832; thin section no. 1832, x150.

Fig. 9. *Paulbronnimannia judicariensis*
Sample no. 737; thin section no. 737, x220.

PLATE-27

Fig. 1. *Paulbronnimannella whittakeri*
Sample no. 1223; thin section no. 1223; an axial view with respect to planispiral stage, x179.

Fig. 2, 3, 5-8. *Palaeolituonella meridionalis.*
2. Sample no. 1317; thin section no. 1317; nearly longitudinal view, x109.
3. Sample no. 1935; thin section no. 1935; nearly longitudinal view, x30.
5. Sample no. 1418; thin section no. 1418; tangential oblique view, x58.
6. Sample no. 1612; thin section no. 1612; nearly longitudinal view, x122.
7. Sample no. 1217; thin section no. 1217; tangential oblique view, x474.
8. Sample no. 1411; thin section no. 1411; tangential oblique view, x119.

Fig. 4. Ataxophragmiid foraminifer
Sample no. 1465; thin section no. 1465; longitudinal view, x183.

PLATE-28

Fig. 1, 4, 7. *Palaeolituonella meridionalis*
1. Sample no. 1489; thin section no. 1489; nearly longitudinal view, x87.
4. Sample no. 1418; thin section no. 1418; longitudinal oblique view cutting first stage, x150
7. Sample no. 1360; thin section no. 1360, x138

Fig. 2, 3, 5-6, 8-9 *Palaeolituonella primitiva.*
2. Sample no. 1347; thin section no. 1347; nearly longitudinal view, x227.
3. Sample no. 1200; thin section no. 1200; longitudinal view, x224.
5. Sample no. 1261; thin section no. 1261; longitudinal view of second stage, x216.
6. Sample no. 735; thin section no. 735; longitudinal view, x150.
8. Sample no. 1332; thin section no. 1332; longitudinal view of second stage, x206.
9. Sample no. 730; thin section no. 730; nearly longitudinal view of second stage, x187.5.

PLATE-29

Fig. 1-9 *Palaeolituonella primitiva n.* sp.

1. Sample no. 1203; thin section no. 1203; longitudinal oblique view of second stage, x 221.5.
2. Sample no. 1211; thin section no. 1211; longitudinal view of second stage, x192.
3. Sample no. 1194; thin section no. 1194; longitudinal view of second stage, x136.
4. Sample no. 1173; thin section no. 1173; longitudinal view of second stage, x158.
5. Sample no. 1175; thin section no. 1175; nearly longitudinal view of second stage, x130.
6. Sample no. 1153; thin section no. 1153; longitudinal view of second stage, x197.
7. Sample no. 784; thin section no. 784; longitudinal oblique view cutting first and second stage, x 169.7
8. Sample no. 1232; thin section no. 1232; longitudinal view, x 107.5.
9. Sample no. 708; thin section no. 708; longitudinal view, x 221.9.

PLATE-30

Fig. 1-2, 5 *Lamelliconus ventroplanus*

1. Sample no. 1835; thin section no. 1835; longitudinal view, x152.
2. Sample no. 1206; thin section no. 1206; nearly longitudinal view, x42.
5. Sample no. 1469; thin section no. 1469; nearly longitudinal view, x76.

Fig. 3-4, 6-8. *Lamelliconus multispirus.*

3. Sample no. 1201; thin section no. 1201; longitudinal tangential view, x166.
4. Sample no. 1437; thin section no. 1437; nearly longitudinal view, x117.
6. Sample no. 1837; thin section no. 1837; nearly longitudinal view, x146.
7. Sample no. 1437; thin section no. 1437; nearly longitudinal view, x107.
8. Sample no. 1212; thin section no. 1212; nearly longitudinal view, x163.

PLATE-31

Fig. 1-10. *Lamelliconus procerus.*

1. Sample no. 1490; thin section no. 1490; nearly longitudinal view, x68.
2. Sample no. 1470; thin section no. 1470; longitudinal view, x100.
3. Sample no. 1364; thin section no. 1364; longitudinal oblique view, x85.
4. Sample no. 1471; thin section no. 1471; longitudinal oblique view, x79.
5. Sample no. 1840; thin section no. 1840; nearly longitudinal view, x124.
6. Sample no. 1471; thin section no. 1471; longitudinal oblique view, x95.
7. Sample no. 1471; thin section no. 1471; nearly longitudinal view, x100.
8. Sample no. 1831; thin section no. 1831; nearly longitudinal view, x162.
9. Sample no. 1439; thin section no. 1439; longitudinal oblique view, x80.
10. Sample no. 1453; thin section no. 1453; longitudinal oblique view, x102.

PLATE-32

Fig. 1-2, 4. *Lamelliconus biconvexus.*
1. Sample no.1437; thin section no.1437; nearly longitudinal view, x134.
2. Sample no. 1835; thin section no.1835; nearly longitudinal view, x127.
4. Sample no.1972; thin section no.1972; nearly longitudinal view, x166.

Fig. 3. *Lamelliconus* cf. *biconvexus*
Sample no.1318; thin section no.1318; nearly longitudinal view, x75.

Fig. 5-8. *Lamelliconus* spp.
5. Sample no.1835; thin section no.1835; nearly longitudinal view, x103.
6. Sample no.1426; thin section no.1426-2; longitudinal oblique view, x188.
7. Sample no.1426; thin section no.1426-2; longitudinal oblique view, x299.
8. Sample no.1212 ; thin section no.1212; longitudinal oblique view, x218.

PLATE-33

Fig. 1-3, 5, 7-8. *Auloconus permodiscoides*
1. Sample no. 956; thin section no. 956; nearly longitudinal oblique view, x84.7
2. Sample no. 501; thin section no. 501; oblique view, x51.
3. Sample no. 956; thin section no. 956; nearly longitudinal view, x75.6.
5. Sample no. 952; thin section no. 952; longitudinal oblique view, x95.
7. Sample no. 952; thin section no. 952; nearly longitudinal view, x83.3.
8. Sample no. 955; thin section no. 955; longitudinal oblique view, x 86.9.

Fig. 4, 6. *Auloconus* spp.
4. Sample no. 1459; thin section no. 1459; oblique view, x77.
6. Sample no. 592; thin section no. 592; oblique view, x46.

PLATE-34

Fig. 1-8. *Triadosdiscus eomesozoicus* A
1. Sample no. 1072, thin section no. 1072; nearly axial view, x120.
2. Sample no. 1327, thin section no. 1327; nearly axial view, X170.
3. Sample no. 1223, thin section no. 1223; nearly axial view, x119.
4. Sample no. 1223, thin section no. 1223; nearly axial view, x55.
5. Sample no. 1318, thin section no. 1318; nearly axial view, x128.
6. Sample no. 1272, thin section no. 1272; nearly axial view, x47.
7. Sample no. 1370, thin section no. 1370; nearly axial view, x56,5.
8. Sample no. 1309, thin section no. 1309; axial oblique view, x48.

PLATE-35

Fig. 1-2, 6. *Triadosdiscus eomesozoicus* A
1. Sample no. 1324, thin section no. 1324; nearly axial view, x53.
2. Sample no. 1348, thin section no. 1348; nearly axial view, x77.
6. Sample no. 1383, thin section no. 1383; nearly axial view, x.92,5

Fig. 3-5, 7-10. *Triadosdiscus eomesozoicus* B
3. Sample no. 1473, thin section no. 1473; nearly axial view, x106.
4. Sample no. 1426, thin section no. 1426; nearly axial view, x140.
5 Sample no. 1426 thin section no. 1426; nearly axial view, x291.
7. Sample no. 1842, thin section no. 1842; nearly axial view, x143.
8. Sample no. 1822, thin section no. 1822; nearly axial view, x109.
9. Sample no. 1861 thin section no. 1861; nearly axial view, x129.
10. Sample no. 1842, thin section no. 1842; nearly axial view, x138.

PLATE-36

Fig. 1, 2, 4, 6, 9. *Triadosdiscus eomesozoicus*

1. Sample no. 1749, thin section no. 1749; nearly axial view, x120.
2. Sample no. 1825, thin section no. 1825; nearly axial view, x158.

4 Sample no. 1853 thin section no. 1853; nearly axial view, x85.5.

6. Sample no. 1828, thin section no. 1828; nearly axial view, x137.
9. Sample no. 1832, thin section no. 1832; nearly axial view, x143.

Fig. 3-5, 7-8, 10-11. *Aulotortus pregaschei*

3. Sample no. 1853, thin section no. 1853, x169.
5. Sample no. 1853, thin section no. 1853, x82.
7. Sample no. 1825, thin section no. 1825, x123.
8. Sample no. 1825, thin section no. 1825, x119.
10. Sample no. 1509, thin section no. 1509, x157,5.
11. Sample no. 1466, thin section no. 1466, x147.

PLATE-37

Fig. 1-9. *Aulotortus friedli*

1. Sample no. 1438, thin section no. 1438, x78.
2. Sample no. 1713, thin section no. 1713, x112.
3. Sample no. 1509, thin section no. 1509, x74.
4. Sample no. 1826, thin section no. 1826, x95.
5. Sample no. 1435, thin section no. 1435, x118.
6. Sample no. 1838, thin section no. 1838, x124.
7. Sample no. 1861, thin section no. 1861, x128.
8. Sample no. 1730, thin section no. 1730, x120.
9. Sample no. 1850, thin section no. 1850, x110.

PLATE-38

Fig. 1-7. *Aulotortus sinuosus pragsoides*

1. Sample no. 1211, thin section no. 1211; nearly axial view, x51,5.
2. Sample no. 1826, thin section no. 1826; axial view, x115.
3. Sample no. 1826, thin section no. 1826; axial view, x112.
4. Sample no. 1719, thin section no. 1719; axial oblique view, x119.
5. Sample no. 1826, thin section no. 1826; axial view, x120.
6. Sample no. 1212, thin section no. 1212; axial oblique view, x107.
7. Sample no. 1749, thin section no. 1749; nearly axial view, x107.

PLATE-39

Fig. 1-7. *Aulotortus* gr. *sinuosus*

1. Sample no.1459, thin section no.1459, x127.
2. Sample no.1507, thin section no.1507, x175.
3. Sample no.1826, thin section no.1826, x117.
4. Sample no.1497, thin section no.1497, x103.
5. Sample no.1848, thin section no.1848, x107.
6. Sample no.1440, thin section no.1440, x135.
7. Sample no.1850, thin section no.1850, x113.

PLATE-40

Fig. 1-9. *Aulotortus communis*

1. Sample no. 1491, thin section no. 1491; nearly axial view, x158.
2. Sample no. 1485, thin section no. 1485; nearly axial view, x98.
3. Sample no. 1459, thin section no. 1459; nearly axial view, x111.
4. Sample no. 1853, thin section no. 1853; nearly axial view, x88.5.
5. Sample no. 1837, thin section no. 1837; nearly axial view, x150.
6. Sample no. 1853, thin section no. 1853; nearly axial view, x104.8.
7. Sample no. 1853, thin section no. 1853; nearly axial view, x110.
8. Sample no. 1853, thin section no. 1853; nearly axial view, x108.7.
9. Sample no. 1719, thin section no. 1853; nearly axial view, x122.

PLATE-41

Fig. 1-2, 3?. *Aulotortus tumidus*

1. Sample no. 1834, thin section no. 1834; nearly axial view, x113.
2. Sample no. 1822, thin section no. 1822; nearly axial view, x141.
3. Sample no. 1473 thin section no. 1473; nearly axial view, x127.

Fig. 4, 7-10. *Aulotortus tenuis*

4. Sample no. 1501 thin section no. 1501; nearly axial view, x186.
6. Sample no. 1861 thin section no. 861; nearly axial view, x135.
7. Sample no. 1842, thin section no. 1842; nearly axial view, x127.
8. Sample no. 1822, thin section no. 1822; nearly axial view, x97.
9. Sample no. 1861 thin section no. 1861; nearly axial view, x135.
10. Sample no. 1842, thin section no. 1842; nearly axial view, x184.

Fig. 5.6. *Aulotortus*? *impressus*

5. Sample no. 1472 thin section no. 1472; nearly axial view, x176.
6. Sample no. 1850, thin section no. 1850; nearly axial view, x135.

PLATE-42

Fig. 1-6. *Aulotortus* sp

1. Sample no. 1202, thin section no. 1202; nearly axial view, x90.
2. Sample no. 1203, thin section no. 1203; nearly axial view, x41.
3. Sample no. 1363, thin section no. 1363; nearly axial view, x110.
4. Sample no. 1828, thin section no. 1828; nearly axial view, x75.
5. Sample no. 1719, thin section no. 1719; nearly axial view, x117.
6. Sample no. 1834, thin section no. 1834; nearly axial view, x136.

Fig. 7. *Aulotortus* sp. or *Glomospirella* sp.

Sample no. 1501, thin section no. 1501; nearly axial view, x241.

PLATE-43

Fig. 1, 3. *Triasina oberhauseri*
1. Sample no. 1507, thin section no. 1507; oblique view, x216.
3. Sample no. 1853, thin section no. 1853; oblique view, x83.

Fig. 2, 4-8. *Triasina hantkeni*
2. Sample no. 930, thin section no. 930, x51.8.
4. Sample no. 956, thin section no. 956, x42.5.
5. Sample no. 955, thin section no. 955, x88.5.
6. Sample no. 952, thin section no. 952, x55.5.
7. Sample no. 500, thin section no. 500, x116.
8. Sample no. 952, thin section no. 952, x59.2.

PLATE-44

Fig. 1-4. *Arenovidalina amilovaluta*
1. Sample no. 1072, thin section no. 1072; nearly axial view, x457.7.
2. Sample no. 1115, thin section no. 1115; nearly axial view, x254.
3. Sample no. 1072, thin section no. 1072; nearly axial view, x226.8.
4. Sample no. 1338, thin section no. 1338; nearly axial view, x343 .8.

Fig. 5-7. *Arenovidalina* spp.
5. Sample no. 737, thin section no. 737; nearly axial view, x386.6.
6. Sample no. 737, thin section no. 737; nearly axial view, x220.3.
7. Sample no. 500, thin section no. 500; nearly axial view, x289.

Fig. 8-10. *Arenovidalina chialingchiangensis.*
8. Sample no. 737, thin section no. 737; nearly axial view, x309.
9. Sample no. 737, thin section no. 737; nearly axial view, x289.4.
10. Sample no. 1115, thin section no. 1115-C; nearly axial view, x238.3.

PLATE-45

Fig. 1-3. *Arenovidalina chialingchiangensis.*
1. Sample no. 1115, thin section no. 1115; nearly axial view, x417.2.
2. Sample no. 1131, thin section no. 1131; nearly axial view, x212.6.
3. Sample no. 737, thin section no. 737; nearly axial view, x286.2.

Fig. 4. *Cornuspira?* sp
Sample no. 737, thin section no. 737; oblique view, x300.

Fig. 5-6, 8. *Planinuvoluta* sp.
5. Sample no. 2105, thin section no. 2105, x188.
6. Sample no. 2105, thin section no. 2105, x201.
8. Sample no. 2107, thin section no. 2107, x164.

Fig. 7. *Meandrospira cheni?*
Sample no. 1115, thin section no. 1115, x348.

Fig. 9. *"Meandrospira" deformata*
Sample no. 1162, thin section no. 1162, x338.

Fig. 10-11. *Meandrospira* ? sp.
10. Sample no. 1161, thin section no. 1161, x180.5.
11. Sample no. 1163, thin section no. 1163, x91.9.

PLATE-46

Fig. 1-5 *Meandrospira dinarcia*

1. Sample no. 1115hin section no. 1115 B transversal view, x505.
2. Sample no. 1115, thin section no. 1115 A; longitudinal oblique view, x408.4.
3. Sample no. 737, thin section no. 737; oblique view, x153.1.
4. Sample no. 737, thin section no. 737; transversal oblique view, x141.7.
5. Sample no. 737, thin section no. 737; nearly transversal view, x337.

Fig. 6-8 *Meandrospira pusilla*

6. Sample no. 737 thin section no. 737; nearly transversal view, x278.3.
7. Sample no. 737, thin section no. 737; nearly transversal view, x506.
8. Sample no. 737, thin section no. 737; nearly transversal view, x313.

Fig. 9-12 *Turriglomina magna*

9. Sample no. 736 thin section no. 736longutudinal oblique view of second stage, x500
10. Sample no. 1296, thin section no. 1296; longitudinal oblique view of second stage, x189.
11. Sample no. 1170, thin section no. 1170; longitudinal oblique view of second stage, x390.6
12. Sample no. 1170, thin section no. 1170; longitudinal oblique view of second stage, x437.5

PLATE-47

Fig. 1-2, 8 *Turriglomina magna*

1. Sample no. 1194 thin section no. 1194 longitudinal oblique view, x232.
2. Sample no. 1341, thin section no. 1341; longitudinal oblique view, x214.
8. Sample no. 1171, thin section no. 1171; longitudinal oblique view, x 833.3.

Fig. 3-4 *Turriglomina mesotriasica*

3. Sample no. 1261 thin section no. 1261 longitudinal view, x 341.7.
4. Sample no. 1171, thin section no. 1171; longitudinal view, x 344.6.

Fig. 5-7 *Turriglomina* spp.

5. Sample no.1212 thin section no. 1212; nearly longitudinal oblique view, x195.
6. Sample no. 1303, thin section no. 1303; oblique view of cutting first stage, X177.
7. Sample no. 1350, thin section no. 1350; oblique view, x250.

Fig. 9-10 *Turriglomina scandonei.*

9. Sample no. 1262 thin section no. 1262; longitudinal oblique view of cutting first stage and first two whorls of second stage, x 172.4.
10. Sample no. 1262, thin section no. 1262; longitudinal oblique view cutting the first stage and first two whorls of the second stage, x94.6.

PLATE-48

Fig. 1-2 *Karaburunia* ? sp.
1. Sample no. 1115 thin section no. 1115 A longitudinal oblique view, x281.
2. Sample no. 1155, thin section no. 1155; tangential view, x198.

Fig. 3, 6 ?*Karaburunia triadica* (ex. *Sigmoilina*)
3. Sample no. 737, thin section no. 7 37; nearly longitudinal view, x310.
6. Sample no. 737, thin section no. 737; oblique view, x225.

Fig. 4-5, 7-9, *Opthalmidium tricki*
4. Sample no. 1115, thin section no. 1115 B; nearly axial view, x245.4.
5. Sample no. 1115, thin section no. 1115 B; nearly axial view, x321.3.
7. Sample no. 1115, thin section no. 1115 A; nearly axial view, x729.4.
8. Sample no. 1115, thin section no. 1115 A; nearly axial view, x381.2.
9. Sample no. 1115, thin section no. 1115A; equatorial view, x194.4.

PLATE-49

Fig. 1-3, *Opthalmidium tricki*
1. Sample no. 1115, thin section no. 1115 B; nearly axial view, x240.9.
2. Sample no. 1115, thin section no. 1115 B; equatorial view, x286.4.
3. Sample no. 1115, thin section no. 1115B; equatorial view, x354.7.

Fig. 4, 6, 9?. *Opthalmidium exiguum*
4. Sample no. 1115, thin section no. 1115 A; equatorial view, x331.6.
6. Sample no. 1185, thin section no. 1185 ; equatorial view, x315.
9?. Sample no. 1150, thin section no. 1150; nearly equatorial view, x295.

Fig. 5, 7-8. *Opthalmidium* spp.
5. Sample no. 1185, thin section no. 1185; equatorial oblique view, x315.
7. Sample no. 1151, thin section no. 1151; equatorial oblique view, x246.
8. Sample no. 1147, thin section no. 1147; equatorial oblique view, x349.

PLATE-50

Fig. 1-2. *Opthalmidium* sp. A
1. Sample no. 1505, thin section no. 1505; equatorial oblique view, x295.
2. Sample no. 1505, thin section no. 1505; equatorial oblique view, x300.

Fig. 3, 4?. *Opthalmidium exiguum.*
3. Sample no. 734, thin section no. 734; equatorial view, x619.
4. Sample no. 736, thin section no. 736; equatorial view, x347.

Fig. 5. *Opthalmidium sp.* B
Sample no. 1468, thin section no. 1468; equatorial oblique view, x257.

Fig. 6-7. *Paraophthalmidium* sp.
6. Sample no. 1202, thin section no. 1202; equatorial oblique view, x294.
7. Sample no. 1341, thin section no. 1341; equatorial oblique view, x275.5.

Fig. 8-9. *Agathammina autroalpina.*
8. Sample no. 1505, thin section no. 1505; longitudinal oblique view, x283.
9. Sample no. 1505,thin section no. 1505; longitudinal oblique view, x353.

PLATE-51

Fig. 1. *Agathammina ? iranica.*
Sample no. 1426, thin section no. 1426; transversal view, x429.6.

Fig. 2-3. *Agathammina austroalpina.*
2. Sample no. 1853, thin section no. 1853; longitudinal view, x333.3.
3. Sample no. 1845, thin section no. 1845; longitudinal view, x183.

Fig. 4. *Galaenella* ? sp.
Sample no. 1223, thin section no. 1223; oblique view, x172.

Fig. 5. *Turrispirillina* sp.
Sample no. 1115, thin section no. 1115; nearly longitudinal view, x155.2.

Fig. 6-8. Duostominid Foram A
6. Sample no. 1115, thin section no. 1115-C; nearly longitudinal view, x336.
7. Sample no. 1115, thin section no. 1115-C; nearly longitudinal view, x312,5.
8. Sample no. 1115, thin section no. 1115-C; nearly longitudinal view, x338.

PLATE-52

Fig. 1, 2. Duostominid foraminifer (A)
1. Sample no. 1115, thin section no. 1115B; nearly longitudinal view, x219.
2. Sample no. 1115, thin section no. 1115A; nearly longitudinal view, x297.

Fig. 3, 5. Duostominid foraminifer (B)
3. Sample no. 1115, thin section no. 1115-C; oblique view, x253.
5. Sample no. 1115, thin section no. 1115-B; oblique view, x256.

Fig. 4, 6-8. Duostominid foraminifer (C)
4. Sample no. 1117, thin section no. 1117; nearly longitudinal view, x124.
6. Sample no. 1154, thin section no. 1154; nearly longitudinal view, x210.
7. Sample no. 1152, thin section no. 1152; nearly longitudinal view, x157.
8. Sample no. 1183, thin section no. 1183; nearly longitudinal view, x154.

PLATE-53

Fig. 1, 3, 5, 7. Duostominid foraminifer (D)
1. Sample no. 1136, thin section no. 1136; longitudinal oblique view, x143.
3. Sample no. 1151, thin section no. 1151; nearly longitudinal view, x215.
5. Sample no. 1154, thin section no. 1154; nearly longitudinal view, x214.
7. Sample no. 1154, thin section no. 1154; nearly longitudinal view, x266.

Fig. 2, 4. Duostominid foraminifer (E)
2. Sample no. 1211, thin section no. 1211; longitudinal oblique view, x106.
4. Sample no. 1179, thin section no. 1179; nearly longitudinal view, x154.

Fig. 6-8. Duostominid foraminifer (F)
6. Sample no. 1469, thin section no. 1469; longitudinal oblique view, x94.
8. Sample no. 1494, thin section no. 1494; nearly longitudinal view, x123.

PLATE-54

Fig. 1, 3. *Variostoma* sp.
1. Sample no. 1159, thin section no. 1159; nearly longitudinal view, x130.
2. Sample no. 1173, thin section no. 1173; nearly longitudinal view, x156.
3. Sample no. 1488, thin section no. 1488; nearly longitudinal view, x95.

Fig. 4-9. Duostominidae
4. Sample no. 1152, thin section no. 1152; transversal view, x141.
5. Sample no. 1471, thin section no. 1471; transversal view, x126.
6. Sample no. 1193, thin section no. 1193; transversal view, x120.
7. Sample no. 1211, thin section no. 1211; transversal view, x109.
8. Sample no. 1503, thin section no. 1503; transversal view, x176.
9. Sample no. 1154, thin section no. 1154; tangential view, x132.

PLATE-55

Fig. 1-2. *Austrocolomia* sp.
1. Sample no. 1180, thin section no. 1180; nearly longitudinal view, x224.9.
2. Sample no. 1159, thin section no. 1159; nearly longitudinal view, x380.

Fig. 3-12. *Nodosariidae*
3. Sample no. 1142, thin section no. 1142; longitudinal view, x 177.7.
4. Sample no. 1115, thin section no. 1115; longitudinal view, x 116.
5. Sample no. 1455, thin section no. 1455; longitudinal oblique view, x131.
6. Sample no. 1072, thin section no. 1072; longitudinal oblique view, x123.6.
7. Sample no. 1832, thin section no. 1832; longitudinal view, x133.
8. Sample no. 1146, thin section no. 1146; longitudinal view, x312.
9. Sample no. 1828, thin section no. 1828; longitudinal oblique view, x126.
10. Sample no. 1078, thin section no. 1078; nearly longitudinal view, x150.7.
11. Sample no. 1406, thin section no. 1406; longitudinal oblique view, x152.
12. Sample no. 1148, thin section no. 1148 longitudinal oblique view, x227.

PLATE-56

Fig. 1-6 Foraminifera n. Gen. n. sp.
1. Sample no. 1853, thin section no. 1853; nearly equatorial view, x48.1.
2. Sample no. 1853, thin section no. 1853; nearly axial view, x46.9.
3. Sample no. 1853, thin section no. 1853; nearly equatorial view, x46.5.
4. Sample no. 1853, thin section no. 1853; nearly axial view, x47.6.
5. Sample no. 1853, thin section no. 1853; nearly equatorial view, x23.7.
6. Sample no. 1853, thin section no. 1853; nearly axial view, x47.8.

PLATE-57

Fig. 1-8 Foraminifera n. Gen n sp.
1. Sample no. 1853, thin section no. 1853; nearly equatorial view, x23.7.
2. Sample no. 1853, thin section no. 1853; equatorial oblique view, x31.2.
3. Sample no. 1853, thin section no. 1853; nearly equatorial view, x41.5.
4. Sample no. 1853, thin section no. 1853; axial oblique view, x47.2.
5. Sample no. 1853, thin section no. 1853; nearly equatorial view, x46.9.
6. Sample no. 1853, thin section no. 1853; nearly equatorial view, x48.5.
7. Sample no. 1853, thin section no. 1853; nearly equatorial view, x47.2.
8. Sample no. 1853, thin section no. 1853; tangential view, x27.

PLATE-58

Fig. 1-6 Foraminifera n. gen n sp.

1. Sample no. 1853, thin section no. 1853; nearly axial view, x46.9.
2. Sample no. 1853, thin section no. 1853; oblique view, x47.6.
3. Sample no. 1853, thin section no. 1853; tangential view, x45.2.
4. Sample no. 1853, thin section no. 1853; nearly axial view, x46.9.
5. Sample no. 1853, thin section no. 1853; nearly equatorial view, x45.9.
6. Sample no. 1853, thin section no. 1853; axial oblique view, x46.9.

PLATE-59

Fig. 1-5, 7 Foraminifera n. gen n sp.

1. Sample no. 1853, thin section no. 1853; tangential view, x47.4.
2. Sample no. 1853, thin section no. 1853; tangential view, x49.3.
3. Sample no. 1853, thin section no. 1853; tangential view, x46.5.
4. Sample no. 1853, thin section no. 1853; nearly axial view, x33.0.
5. Sample no. 1853, thin section no. 1853; tangential view, x47.2.
7. Sample no. 1853, thin section no. 1853; tangential view, x140.8.
8. Foraminifera. n. gen, n. sp and *Aulotortus communis*
   Sample no. 1853, thin section no. 1853; axial oblique view; x43.1.

PLATE-60

Fig. 1-3, 5 Foraminifera n. Gen n sp.

1. Sample no. 1853, thin section no. 1853x; nearly longitudinal view, x39.8.
2. Sample no. 1853, thin section no. 1853x; axial oblique view, x61.3.
3. Sample no. 1853, thin section no. 1853x; tangential view, x46.5.
5. Sample no. 1853, thin section no. 1853x; nearly axial view, x46.5.

Fig. 4. Unknown foraminifera (b)
Sample no. 1129, thin section no. 1129, x76.

Fig. 6-8. Unknown foraminifera (b)

6. Sample no. 1115, thin section no. 1115B, x255.
7. Sample no. 1115, thin section no. 1115, x253.
8. Sample no. 1115, thin section no. 1115, x64.1.

PLATE-61

Fig. 1, 3. Unknown foraminifera (C)

1.Sample no. 1283, thin section no. 1283; probable longitudinal view, x138.
3.Sample no. 1192, thin section no. 1192; probable longitudinal view, x48.

Fig. 2, 4-8. Unknown foraminifera (b)

2. Sample no. 1281, thin section no. 1281, x167.
4. Sample no. 1379, thin section no. 1379.
5. Sample no. 1137, thin section no. 1137, x99.
6. Sample no. 1461, thin section no. 1461, x.
7. Sample no. 1377, thin section no. 1377, x.
8. Sample no. 1377, thin section no. 1377, x.

PLATE-62

Fig. 1. *Nautiloculina* sp.
Sample no. 133, thin section no. 133; equatorial view, x50.

Fig. 2-4, 6. *Mayncina termieri*
2. Sample no. 110, thin section no. 110; nearly longitudinal oblique view, x53.
3. Sample no. 802, thin section no. 802D; nearly longitudinal oblique view, x.
4. Sample no. 801, thin section no. 801C; longitudinal oblique view of second stage, equatorial view of first stage, x.
6. Sample no. 100, thin section no. 100; longitudinal view of second stage, equatorial view of first stage, x54.

Fig. 5.*Bosniella* ?sp.
Sample no. 89, thin section no. 89; transversal oblique view, x87,5.

Fig. 7-8. *Labyrinthina* cf. *recoarensis*
7. Sample no. 72, thin section no. 72; longitudinal oblique view of second stage, nearly equatorial view of first stage, x31.
8. Sample no. 72 , thin section no. 72; longitudinal view of second stage, x31

Fig. 9-12. *Labyrinthina* sp.
9. Sample no. 72, thin section no. 72A; longitudinal oblique view of second stage, x31.
10. Sample no. 72, thin section no. 72; transversal view of second stage, x62,5.
11. Sample no. 72 ,thin section no. 72; nearly longitudinal view of second stage, x.
12. Sample no. 72, thin section no. 72; longitudinal oblique view of second stage, equatorial view of first stage, x29,3.

PLATE-63

Fig. 1-2. *Orbitopsella primaeva*
1. Sample no. 68, thin section no. 68; longitudinal view of pioneering stage, x 96.
2. Sample no. 95, thin section no. 95; longitudinal view of pioneering stage, x72.

Fig. 3, 6. *Orbitopsella aff primaeva*
3. Sample no. 78, thin section no. 78; longitudinal view, x33,5.
6. Sample no. 78, thin section no. 78; longitudinal view, x30,7.

Fig. 4-5. *Orbitopsella praecursor*
4. Sample no. 68 ,thin section no. 68; longitudinal view of pioneering stage, x55.
5. Sample no. 110, thin section no. 110,2; longitudinal view of pioneering stage, x49.,4.

Fig. 7-9. *Orbitopsella* sp.
7. Sample no. 95, thin section no. 95; oblique view of cutting second stage, x.13
8. Sample no. 95 , thin section no. 95; oblique view of cutting second stage, x.13
9. Sample no. 95 , thin section no. 95; oblique view of cutting second stage, x12.7.

PLATE-64

Fig. 1. *Mesoendothyra croatica*
Sample no. 152, thin section no. 152; nearly longitudinal view, x96.5.

Fig. 2-3, 5-6. *Amijiella amiji*
2. Sample no. 89, thin section no. 89; tangential view, x60.9.
3. Sample no. 807, thin section no. 807C; oblique view, x.
5. Sample no. 807, thin section no. 807; transversal oblique view, x.
6?. Sample no. 121, thin section no. 121; longitudinal tangential view, x87.6.

Fig. 4. . *Pseudocyclammina liassica*
Sample no. 124, thin section no.124, longitudinal view, x17.8.

Fig. 7-8 *Pseudocyclammina* sp (2)
7. Sample no. 268, thin section no. 268; longitudinal oblique view, x45.
8. Sample no. 232, thin section no. 232; longitudinal oblique view, x20.

Fig. 9.*Pseudocyclammina* sp. (1)
Sample no. 124, thin section no. 124-2; nearly longitudinal view of second stage view, x 30

PLATE-65

Fig. 1-2, 4. *Haurania* cf. *deserta*
1. Sample no. 806, thin section no. 806 A; transversal oblique view, x.
2. Sample no. 809, thin section no. 809 B; transversal oblique view, x.
3. Sample no. 809, thin section no. 809 A; transversal oblique view, x.

Fig. 3. *Trochammina* sp.
Sample no. 14, thin section no. 14; nearly longitudinal view, x71.

Fig. 5. *Limognella* sp.
Sample no. 268, thin section no. 268-2; nearly longitudinal view, x 64.

Fig. 6, 8-9, 11?,12. *Pfenderina* cf. *trochoidea*
6. Sample no. 194, thin section no. 194; transversal oblique view, x62.5.
8. Sample no. 194, thin section no. 194; transversal oblique view; x62.5.
9. Sample no. 198, thin section no. 198; oblique view; x84.
11? Sample no. 198, thin section no. 198A; transversal oblique view, x35.7.
12. Sample no. 191, thin section no. 191; longitudinal oblique view, x51.5.

Fig. 7, 10. *Pfenderina* sp. (1)
7. Sample no. 128, thin section no. 128; transversal view, x95.
10.Sample no. 129, thin section no. 129; longitudinal tangential view, x94.

PLATE-66

Fig. 1-4. *Pfenderina* sp. (2)
1. Sample no. 192, thin section no. 192; nearly longitudinal view, x 87.5.
2. Sample no. 196, thin section no. 196; longitudinal oblique view, x 91.5.
1. Sample no. 189, thin section no. 189; nearly longitudinal view, x53.
2. Sample no. 226, thin section no. 226; longitudinal oblique view, x90.

Fig. 5-7, 11. "*Siphovalvulina*" sp. (*variablis*)
5. Sample no. 809, thin section no. 809; nearly longitudinal view, x.
6. Sample no. 809, thin section no. 809; nearly longitudinal view, x.
7. Sample no. 84, thin section no. 84; nearly longitudinal view, x69.
11. Sample no. 802, thin section no. 802; nearly longitudinal view, x.

Fig. 8. *Conicocurnubia orbitoliniformis*
Sample no. 189 ,thin section no. 189; nearly longitudinal view, x49.

Fig. 9. *Earlandia* sp.
Sample no. 84, thin section no. 84; longitudinal oblique view, x41.

Fig. 10. *Lituolocea*
Sample no. 28, thin section no. 28; longitudinal oblique view, x24.

Fig. 12. *Trocholina* sp.
Sample no. 45, thin section no. 45; longitudinal oblique view, x116.

PLATE-67

Fig. 1-2 *Kilianina rohonensis*
1. Sample no. 133, thin section no. 133; nearly longitudinal view, x20.6.
2. Sample no. 216, thin section no. 216; nearly longitudinal view, x20.6.

Fig. 3. *Protopeneroplis striata*
Sample no. 220, thin section no. 220, x.

Fig. 4, 6. *Kilianina* cf. *lata*
4. Sample no. 259, thin section no. 259; nearly longitudinal view, x19.
6. Sample no. 259?, thin section no. 259A?; tangential view, x.

Fig. 5, 7. *Lenticulina* sp.
5. Sample no. 191, thin section no. 191; nearly axial view, x62.5.
7. Sample no. 250, thin section no. 250-2; equatorial view, x105.7.

Fig. 8-11. *Kilianina* sp.
8. Sample no. 235, thin section no. 235; tangential view, x29.5.
9. Sample no. 252, thin section no. 252; tangential view, x29.
10. Sample no. 213, thin section no. 213; tangential view, x31.
11. Sample no. 259, thin section no. 259; tangential view, x37.5.

PLATE-68

Fig. 1-10 *Kilianina uzunkuyuiana*
1. Sample no. 149, thin section no. 149; nearly longitudinal view, x24.4.
2. Sample no. 203, thin section no. 203; transversal view, x91.
3. Sample no. 139, thin section no. 139; nearly longitudinal view, x20.4.
4. Sample no. 270, thin section no. 270; nearly longitudinal view, x.
5. Sample no. 203, thin section no. 203; nearly longitudinal view, x21.5.
6. Sample no. 140, thin section no. 140; nearly longitudinal view, x29.5.
7. Sample no. 265, thin section no. 265; nearly longitudinal view, x30.
8. Sample no. 241, thin section no. 241; transversally tangential view, x30.
9. Sample no. 189 ,thin section no. 189; longitudinally tangential view, x53,4.
10. Sample no. 148,thin section no. 148; transversal oblique view, x 50.8.

PLATE-69

Fig. 1-2 *Kilianina uzunkuyuiana n.* sp
1. Sample no. 267, thin section no. 267 ; nearly longitudinal view; x21.5.
2?. Sample no. 262, thin section no. 262; nearly transversal view; x.

Fig. 3-10. *Parurgonina caelinensis*
3. Sample no. 197, thin section no. 197; nearly longitudinal view, x29.,5.
4. Sample no. 219, thin section no. 219; nearly longitudinal view, x28.
5. Sample no.170, thin section no. 103; nearly longitudinal view, x21.4.
6. Sample no. 219, thin section no. 219; nearly longitudinal view, x22.
7. Sample no. 252, thin section no. 252; nearly longitudinal view, x29.2.
8. Sample no. 217, thin section no. 217; transversally tangential view, x29.
9. Sample no. 126, thin section no. 126; longitudinally tangential view, x28,7.
10. Sample no. 127, thin section no. 127; transversal oblique view, x20.2.

PLATE-70

Fig. 1-2, 4. *Parurgonina caelinensis*
1. Sample no. 127, thin section no. 127 ; longitudinal view, x20.6.
2. Sample no. 127, thin section no. 127; longitudinal view of first stage, x62.4.
4. Sample no. 127, thin section no. 127 ; detailed photo of figure 1, x61.4.

Fig. 3, 5-7. *Parurgonina* cf. *caelinensis*
3. Sample no. 261, thin section no. 261; nearly longitudinal view, x29.
5. Sample no. 224, thin section no. 224; nearly longitudinal view, x29.
6. Sample no.222, thin section no. 222; nearly longitudinal view, x28.7.

Fig. 8. *Earlandia* sp.
Sample no. 809, thin section no. 809B; nearly longitudinal view, x.

PLATE-71

Fig. 1. f. *Mayncina bulgarica*
Sample no. 832, thin section no. 832 ; equatorial view, x55.5.

Fig. 2-4. *Nezzazata simplex*
2. Sample no. 322, thin section no.322; transversal view, x63.
3. Sample no. 322, thin section no.322; nearly longitudinal view, x51.
4. Sample no. 322, thin section no.322; transversal view, x56.

.Fig. 5-6. *Nezzazata spp.*
4. Sample no. 295, thin section no. 295-2; transversal oblique view, x126.
6. Sample no.296, thin section no. 296-2; longitudinal oblique view, x80.

Fig. 7 *Nezzazatinella spp.*
Sample no. 299, thin section no. 299; transversal oblique view, x127.

Fig. 8, 10. *Cuneolina* gr. *pavonia*
8. Sample no. 311, thin section no. 311-2; equatorial view, x34.
10. Sample no. 303, thin section no. 303; transversal oblique view, x30.7.

Fig. 9. Foraminifer indet. oblique view, x76.

PLATE-72

Fig. 1. *Cuneolina parva*
Sample no. 819, thin section no. 819; nearly longitudinal view, x66.6.

Fig. 2. *Cuneolina* sp.
Sample no. 284, thin section no.284; longitudinal oblique view, x58.6.

Fig. 3, 6. *Vercorsella arenata*
3. Sample no. 299, thin section no. 299-3; transversal view, x125.
6. Sample no.299, thin section no. 296-3; longitudinal view, x52.

Fig. 4. *Sabaudia* cf. *capitata*
Sample no. 283, thin section no. 283; nearly longitudinal view, x143.

Fig. 5, 7. *Sabaudia minuta*
5. Sample no. 311, thin section no. 311-2; longitudinal oblique view, x116.5.
7. Sample no. 295, thin section no. 295-2; transversal view, x116.5.

Fig. 8. *Valvulineria* sp.
Sample no. 296, thin section no. 296-2; nearly longitudinal view, x122.

Fig. 9. Discorbidae
Sample no. 295, thin section no. 295-2; nearly longitudinal view, x100.

Fig. 10. *Earlandia sp.*
Sample no. 299, thin section no. 299-2; nearly longitudinal view, x90.

Fig. 11. *Orbitolina sp.* 2
Sample no. 330, thin section no. 330, nearly longitudinal view, x18.6.

PLATE-73

Fig. 1. *Orbitolina (Conicorbitolina)* gr. *paenaconica*
Sample no. 833, thin section no. 833; longitudinal oblique view, cutting pioneering stage, x33.5.

Fig. 2, 4. *Orbitolina* sp.
2. Sample no. 325, thin section no.325; longitudinal oblique view, x21.6.
4. Sample no. 326, thin section no. 326; longitudinal oblique view, x20.

Fig. 3, 5. *Orbitolina (Conicorbitolina)* sp.
3. Sample no. 326, thin section no. 326; nearly longitudinal view, x31.
5. Sample no.326, thin section no. 326 A; nearly longitudinal view, x31.

Fig. 6. *Spiroloculina* sp.
Sample no. 295, thin section no. 295-2; nearly axial view, x122.5.

Fig. 7. *Sigmoilina* sp.
Sample no. 815, thin section no. 815; axial view, x.

Fig. 8. Orbitolinidae
Sample no. 283, thin section no. 283, x.

Fig. 9. *Vidalina* sp.
Sample no. 320, thin section no. 320; nearly axial view, x117.5.

Fig. 10. "*Hensonina*" *lenticularis=Involutina hungarica*
nearly axial view, x46.

PLATE-74

Fig. 1. *Maesilina* sp.
Sample no. 303, thin section no. 303; nearly axial view, x47.5.
Fig. 2. *Dobrogelina* ? sp.
Sample no. 282, thin section no.282-2; transversal view, x100.
Fig. 3. *Pseudocyclammina rugosa*
Sample no. 819, thin section no. 819; longitudinal oblique view, x25.
Fig. 4, 5, 6. *Daxia* ? sp.
4. Sample no. 295, thin section no. 295; nearly axial view, x128.
5. Sample no. 319, thin section no. 319-2; axial view, x87.
6. Sample no. 830, thin section no. 830; nearly axial view, x.
Fig. 7, 8, 10. *Rotalia mesogeensis*
7. Sample no. 330, thin section no. 330; nearly axial view, x 76.5.
8. Sample no. 330, thin section no. 330; nearly axial view, x 86.
10. Sample no. 841, thin section no. 841; nearly axial view, x.
Fig. 9. *Nummuloculina heimi*
Sample no. 283, thin section no. 283; equatorial oblique view, x71.

PLATE-75

Fig. 1, 2, 5. *Praechrysalidina infracretacea*
1. Sample no. 283, thin section no. 283; nearly longitudinal view, x38.
2. Sample no. 283, thin section no. 283; nearly longitudinal view, x37.
5. Sample no. 283, thin section no. 283; transversal oblique view, x55.
Fig. 3-4. *Favusella washitensis*
3. Sample no. 843, thin section no.843; nearly longitudinal view, x.
4. Sample no. 329, thin section no. 329; oblique view, x110.
Fig. 6, 8. cf. *Praechrysalidina infracretacea*
6. Sample no. 284, thin section no. 284; nearly transversal view, x33.
8. Sample no. 283, thin section no. 283,
slightly oblique longitudinal view, x32.8.
Fig. 7, 9, 10. *Nummuloculina* cf. *heimi*
7. Sample no. 284, thin section no. 284; equatorial oblique view, x65.
9. Sample no. 816, thin section no. 816; Oblique view, x.
10. Sample no. 319, thin section no. 319; equatorial oblique view, x.

PLATE-76

Fig. 1,3. *Teutloporella peniculiformis*
1. Sample no. 1138, thin section no. 1138; tangential view, x 14.7.
3. Sample no.1135, thin section no. 1135B; tangential view, x20.7.
Fig. 2. *Teutloporella ?* cf. *herculea*
Sample no. 2103, thin section no. 2103A; transversal oblique view, x23.4.
Fig. 5,8. *Teutloporella herculea*
5. Sample no. 1627, thin section no. 1627; longitudinal view, x24.
8. Sample no.1616, thin section no. 1616; transversal oblique view, x24.
Fig. 4,6-7. *Teutloporella* ? sp.
4. Sample no. 1145, thin section no. 1145; longitudinal view, x26.7.
6. Sample no.1443, thin section no. 1443; transversal view, x59.
7. Sample no.1443, thin section no. 1443; oblique view, x40.

PLATE-77

Fig. 1-4, 6. *Diplopora subtilis* var. *gracca*
1. Sample no. 1135, thin section no. 1135; nearly longitudinal view, x22.
2. Sample no.1137, thin section no. 1137; longitudinal view, x39.
3. Sample no. 1144, thin section no. 1144; longitudinal view, x22.
4. Sample no.1145, thin section no. 1145; transversal view, x35.6.
6. Sample no.1135, thin section no. 1135; longitudinal oblique view, x35.4.

Fig. 5. *Diplopora* sp.
Sample no. 2103, thin section no, 2103; longitudinal view, x90.

Fig. 7,8. *Teutloporella peniculiformis*
7. Sample no. 1135, thin section no. 1135B; longitudinal view, x15.5.
8. Sample no.1135, thin section no. 1135A; tangential view, x19.

PLATE-78

Fig. 1-5. *Diplopora annulata*
1. Sample no. 1318, thin section no. 1318; longitudinal oblique view, x17.5.
2. Sample no.1318, thin section no. 1318; transversal view, x17.
3. Sample no. 1318, thin section no. 1318; transversal oblique view, x17.
4. Sample no.1318, thin section no. 1318; oblique view, x18.6.
5. Sample no.1135, thin section no. 1318; transversal oblique view, x17.

PLATE-79

Fig. 1-5. *Diplopora nodosa*
1. Sample no. 1213, thin section no. 1213; longitudinal oblique view, x17.5.
2. Sample no.777, thin section no. 777; oblique view, x17.
3. Sample no. 777, thin section no. 777; tangential view, x24.
4. Sample no.1314, thin section no. 1314; longitudinal view, x16.6.
5. Sample no.778, thin section no. 778; nearly longitudinal view, x16.

PLATE-80

Fig. 1-7. *Oligoporella pilosa*?
1. Sample no. 1145, thin section no. 1145; longitudinal oblique view, x14.
2. Sample no.1135, thin section no. 1135; transversal view, x23.
3. Sample no. 1134, thin section no. 1134; transversal view, x27.5.
4. Sample no.1145, thin section no. 1145; transversal view, x26.
5. Sample no.1145, thin section no. 1145; longitudinal oblique view, x18.
6. Sample no.1129, thin section no. 1129; transversal view, x31.
7. Sample no.1145, thin section no. 1145; transversal view, x18.

PLATE-81

Fig. 1-3. *Acicularia* sp.
1. Sample no. 2156, thin section no. 2156; oblique view, x65.
2. Sample no.1971, thin section no. 1971; longitudinal oblique view, x57.
3. Sample no.1971, thin section no. 1971; longitudinal oblique view, x46.

Fig. 4- 5. *Macroporella alpina*
4. Sample no. 1115, thin section no. 1115; longitudinal view, x42.
5. Sample no. 1115, thin section no. 1115; transversal view, x33.5.

Fig. 6. *Diplopora* cf. *borzai*
Sample no. 1134, thin section no. 1134; longitudinal oblique view, x17.

PLATE-82

Fig. 1-2, 4. *Physoporella* cf. *varicaus*
1. Sample no. 1135, thin section no. 1135; longitudinal view of wall, x18.
2. Sample no.1138, thin section no. 1138; longitudinal view, x17.
4. Sample no.1137, thin section no. 1137; longitudinal view, x16.

Fig. 3,5. *Physoporella pouciforata* var. *undulata*
3. Sample no. 2110, thin section no. 2110; transversal view, x47.
5. Sample no.2110, thin section no. 2110; longitudinal oblique view, x25.5.

Fig. 6. *Physoporella* sp. (n.sp)
Sample no. 1145, thin section no. 1145; longitudinal oblique view, x17.

PLATE-83

Fig. 1. *Physoporella pouciforata* var. *sulcata*?
Sample no. 1821, thin section no. 1821; longitudinal oblique view, x23.

Fig. 2-3,5, *Physoporella* sp.
2. Sample no. 1129, thin section no. 1129; longitudinal oblique view, x41.
3. Sample no.1134, thin section no. 1134; transversal view, x25.5.
5. Sample no.1129, thin section no. 1129; transversal view, x19.

Fig. 4. *Poikiloporella dublicata*
Sample no. 1749, thin section no. 1749; longitudinal oblique view, x27.

Fig. 6. *Cyroporella* sp
Sample no. 1500, thin section no. 1500; longitudinal oblique view, x19.

PLATE-84

Fig. 1, 4, *Clypeina* cf. *besici*
1. Sample no. 1822, thin section no. 1822; transversal view, x113.
4. Sample no. 1822, thin section no. 1822, x67.4.

Fig. 2-3,5-6, 8-9 *Palacodasycladus mediterranus*.
2. Sample no. 805, thin section no. 805; longitudinal view, x20.
3. Sample no. 802, thin section no. 802B; longitudinal view, x16.
5. Sample no. 805, thin section no. 805A; longitudinal view, x20.
6. Sample no. 804, thin section no. 804A; transversal oblique view, x22.
7. Sample no. 802, thin section no. 802A; oblique view, x23
8. Sample no. 800, thin section no. 800C; longitudinal oblique view, x27.

Fig. 9. *Macroporella retica*
Sample no. 63, thin section no. 63; transversal view, x36.3.

PLATE-85

Fig. 1-8. *Paleodasycladus mediterraneus*

1. Sample no. 71, thin section no. 71; longitudinal view, x18.
2. Sample no. 80, thin section no. 80; oblique view, x20.7.
3. Sample no. 80, thin section no. 71; longitudinal view, x21.
4. Sample no. 80, thin section no. 80; oblique view, x23.
5. Sample no. 802, thin section no. 802; longitudinal view, x16.
6. Sample no. 48, thin section no. 48; longitudinal view, x18.7.
7. Sample no. 809, thin section no. 809; longitudinal oblique view, x16.
8. Sample no. 809, thin section no. 809-A longitudinal oblique view, x14.

PLATE-86

Fig. 1-2, 4. *Cylindroporella kochanskyae*

1. Sample no. 824, thin section no. 824; transversal view, x50.
2. Sample no. 302, thin section no. 302; transversal oblique view, x50.
4. Sample no. 825, thin section no. 825; subaxial longitudinal view, x50.

Fig. 3. *Cylindroporella ivanovici*

Sample no. 828, thin section no. 828; view of the basal shaft with sterile ramification only, followed by the broken fertile part, x50.

Fig. 5. *Hensonella urladanasi*

Sample no. 816, thin section no. 816; subaxial oblique view, x50.

Fig. 6-7. *Heteroporella lepina*

6. Sample no. 312, thin section no. 312; subaxial oblique view, x50.
7. Sample no. 826, thin section no. 826; view of an isolated nodule, x100.

Fig. 8, 11. *Neomeris* sp.

8. Sample no.825, thin section no. 825; oblique longitudinal view, x50.
11. Sample no. 312, thin section no. 312; oblique longitudinal view, x50..

Fig. 9,13-14. *Salpingoporella hasi.*

9. Sample no.814, thin section no. 814; longitudinal oblique view, x50.
13. Sample no. 303, thin section no. 303; transversal view, x50.
14. Sample no.304, thin section no. 304; transversal view, x50.

Fig. 10. *Cylindroporella* cf. *ivancovici*

Sample no.328, thin section no. 328; longitudinal oblique, transversal view, x20.

Fig. 12. *Salpingoporella* aff. *milanovici*

Sample no.824, thin section no. 824; subtangential longitudinal view, x50.

PLATE-87

Fig. 1. *Salpingoporella* ? cf. *furgida*

Sample no. 815, thin section no. 815; transversal view, x25.

Fig. 2. *Cladocoropsis mirabilis*

Sample no. 157, thin section no. 157; longitudinal view, x11.6.

Fig. 3-4. *Terquemella* cf. *antiqua*

3. Sample no. 304, thin section no. 304; subaxial view, x 100.
4. Sample no. 304, thin section no. 304; arrow points out the specimen illustrated on figure 3.

Fig. 5. *Parafavreina tronetensis*

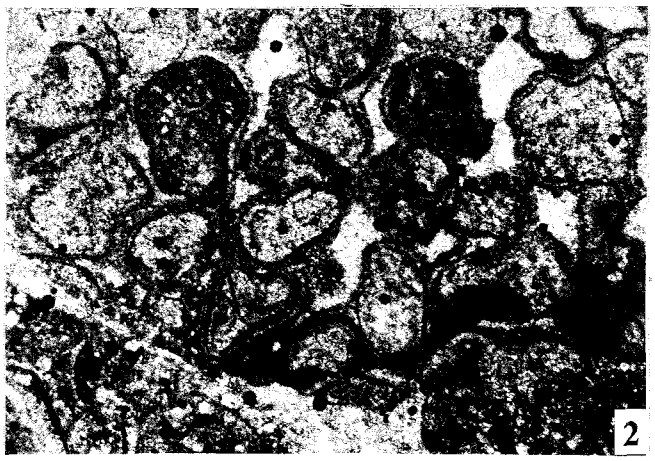
Sample no. 504, thin section no. 504; axial view, x68.5.

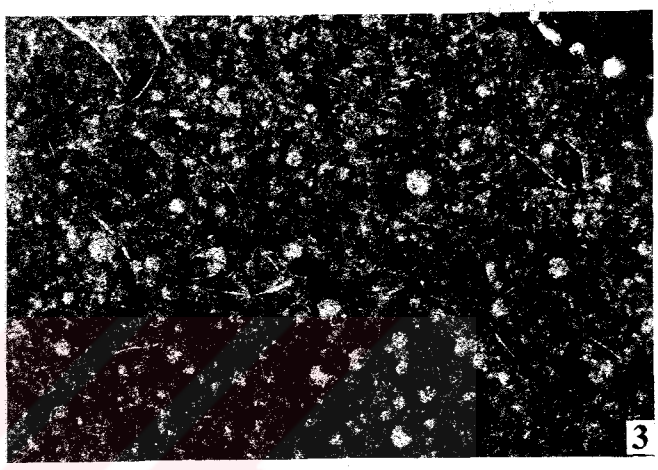
Fig. 6-7. *Thaumatoporella parvovesiculifera*

6 Sample no. 12, thin section no. 12; x24.
7 Sample no. 69, thin section no. 69; axial view of a bulp, x66.6.

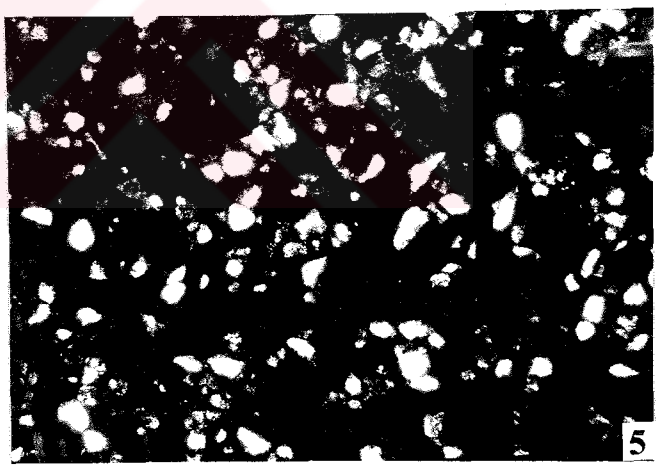
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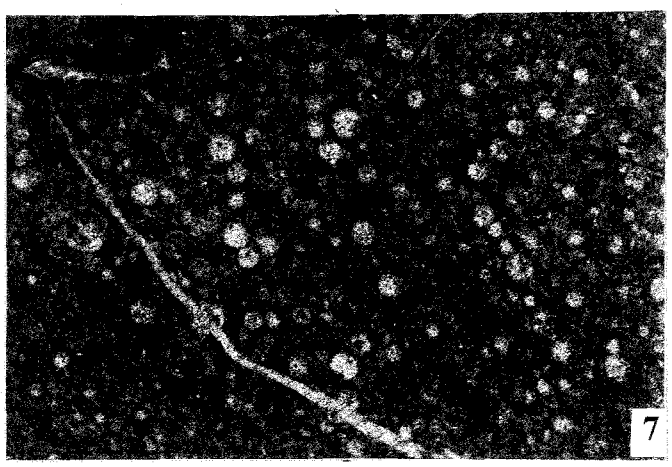

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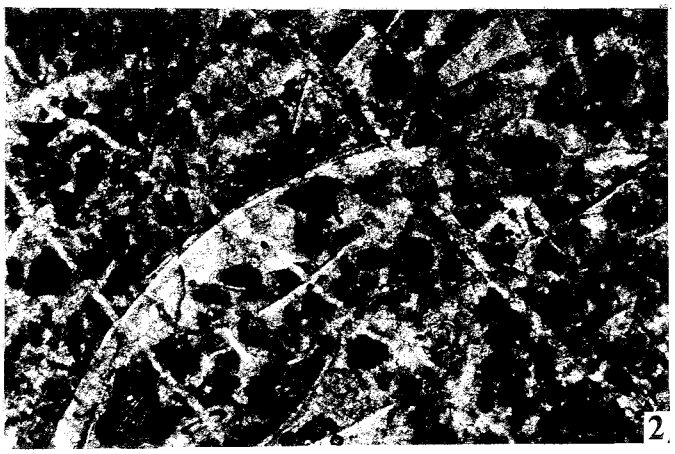

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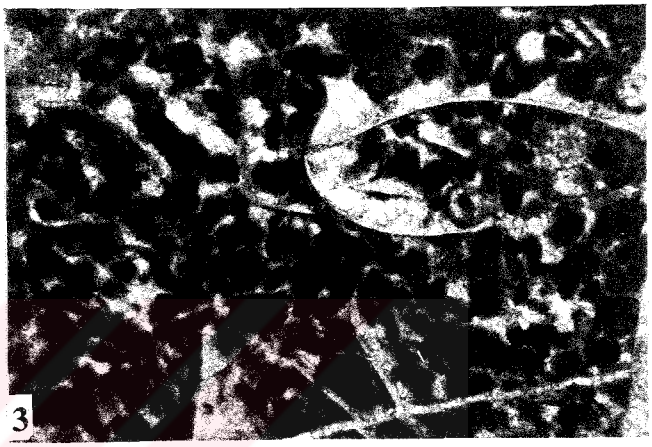

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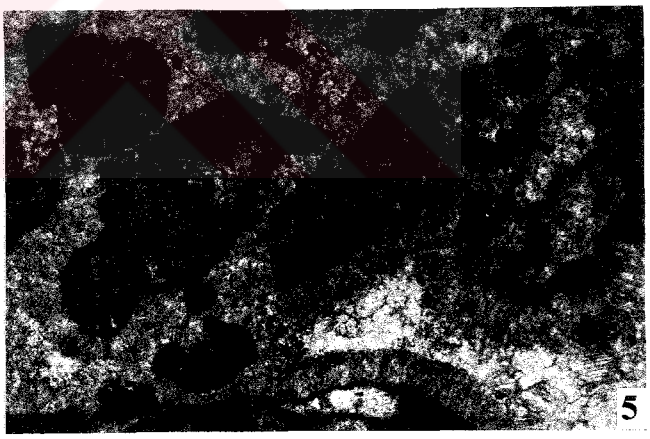

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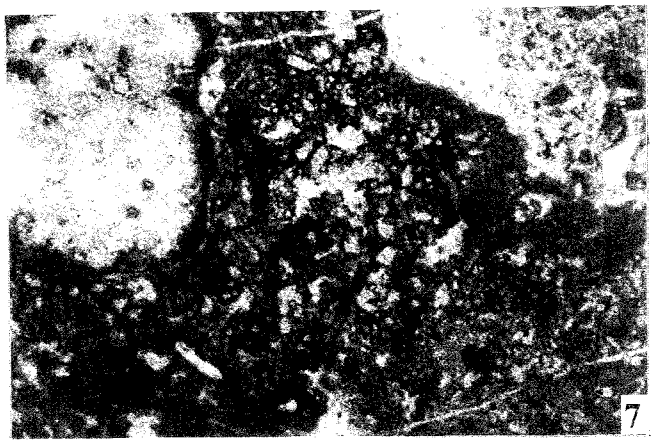

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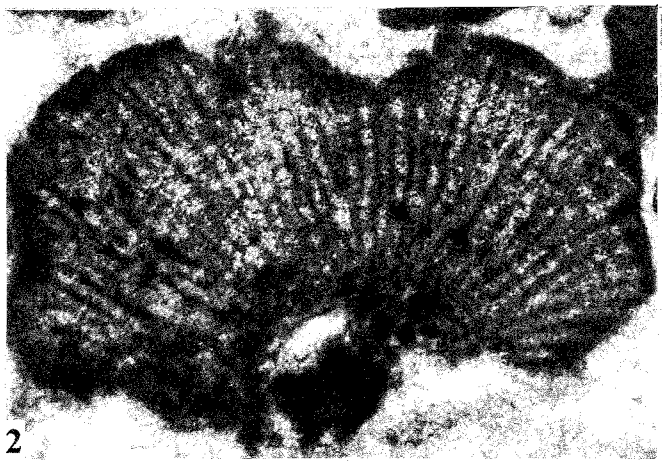

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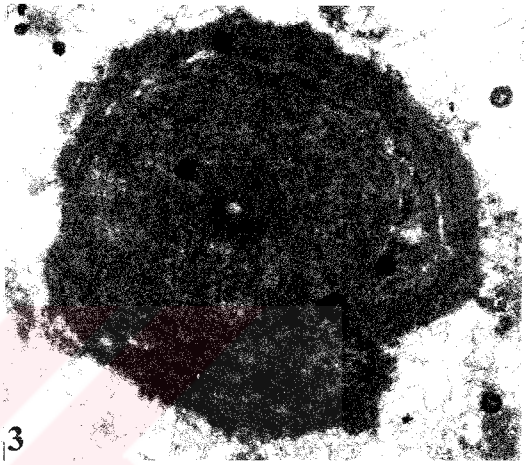

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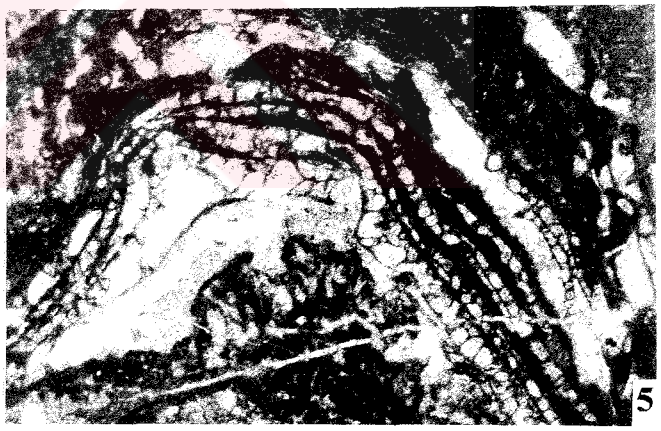

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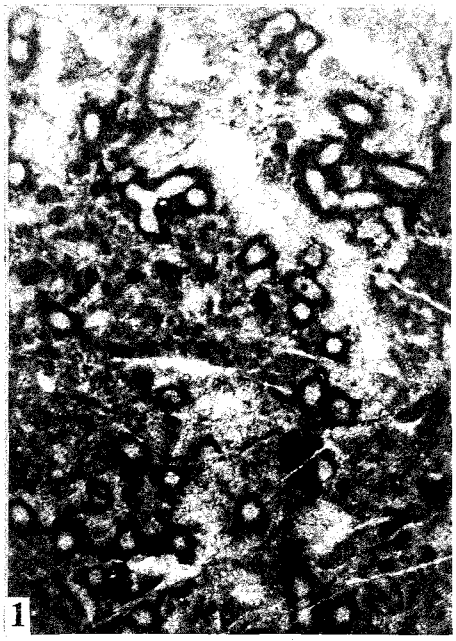

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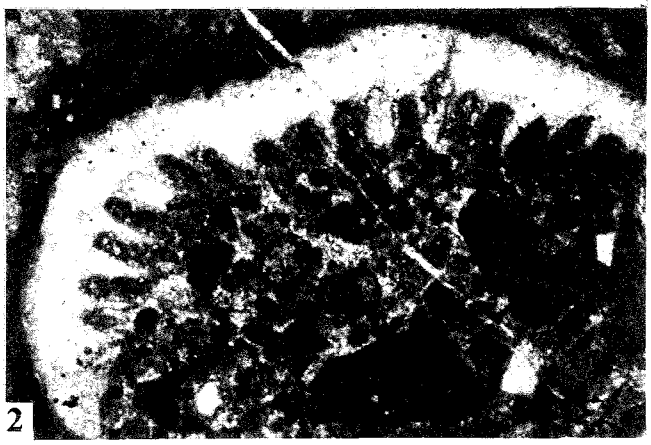

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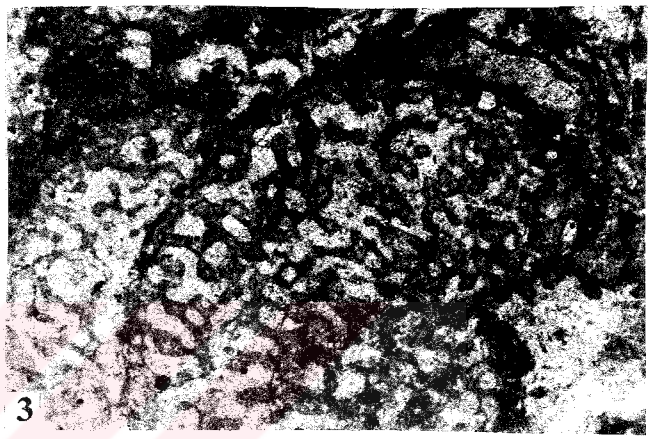

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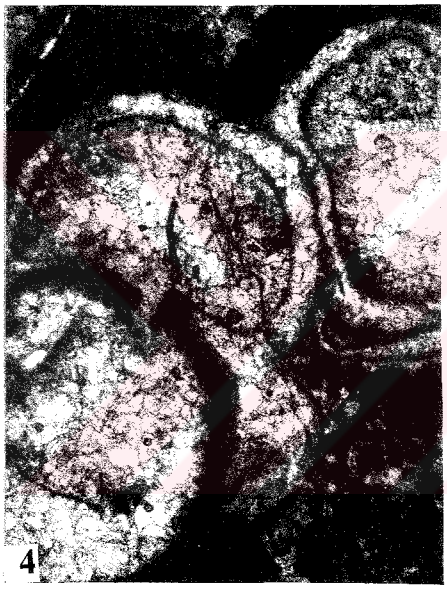

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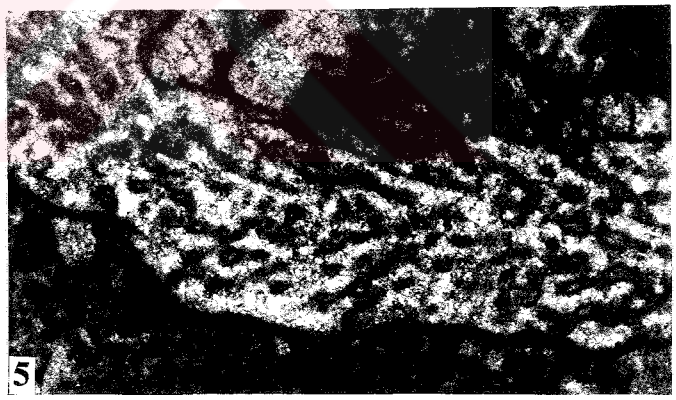

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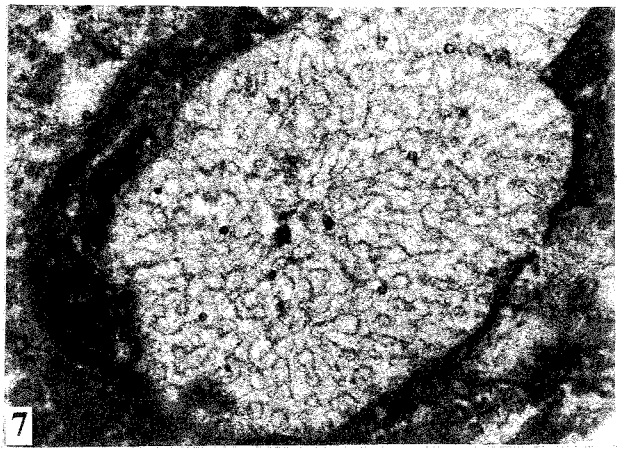

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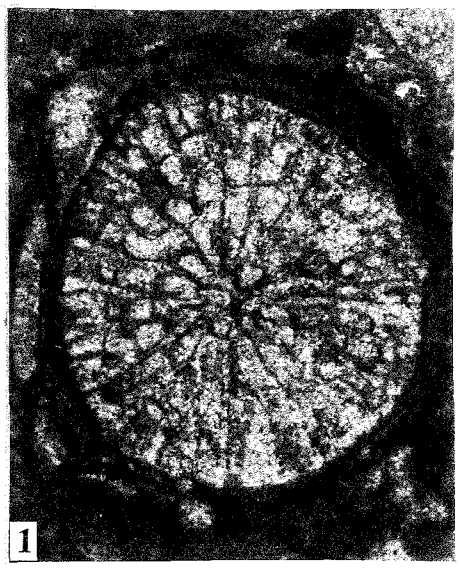

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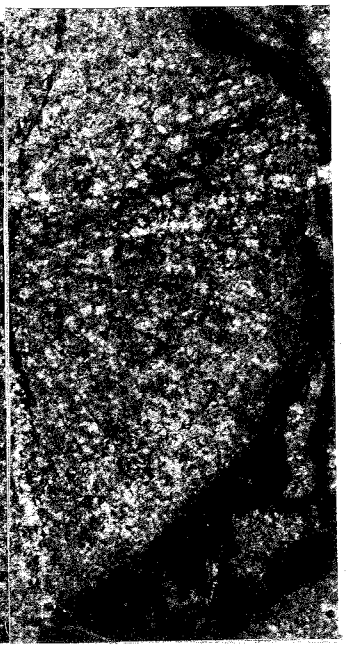

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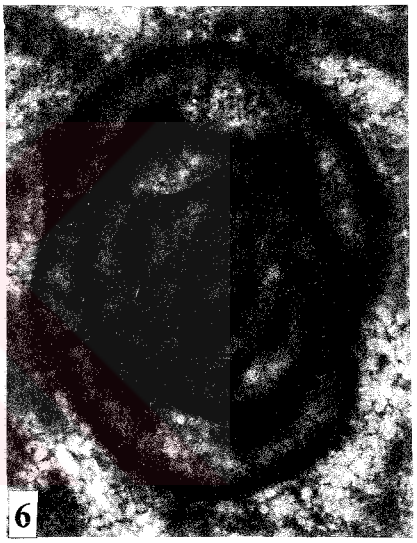

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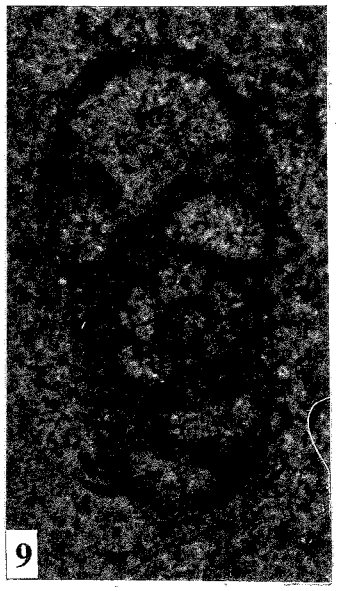

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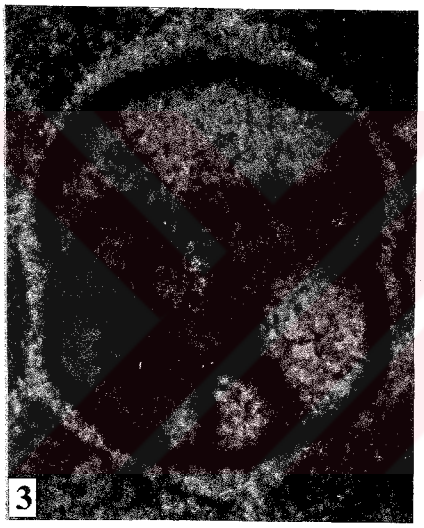

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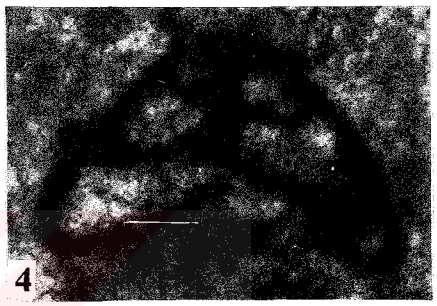

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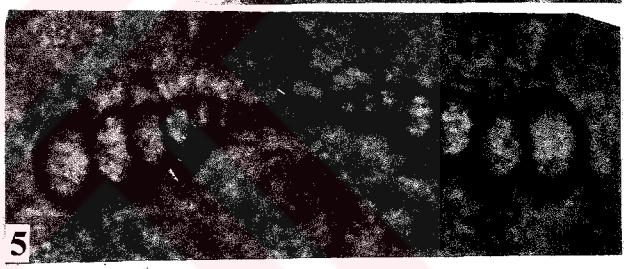

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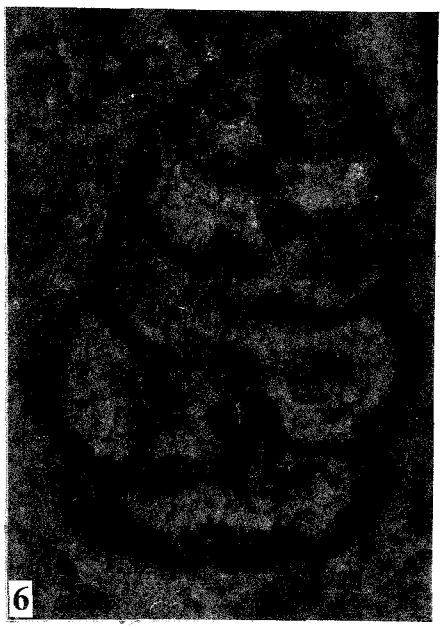

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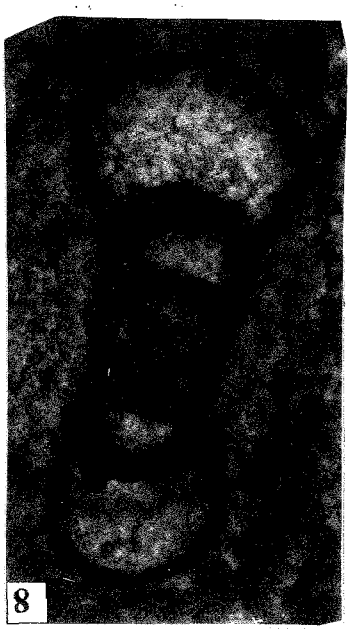
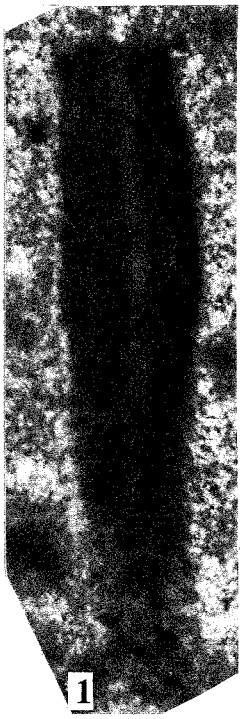

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Plate 8


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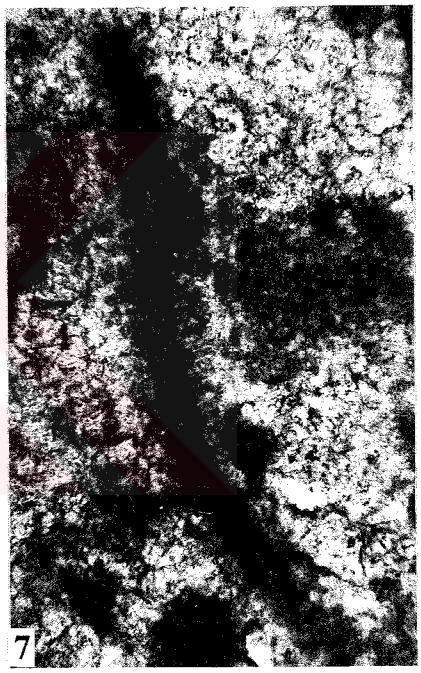

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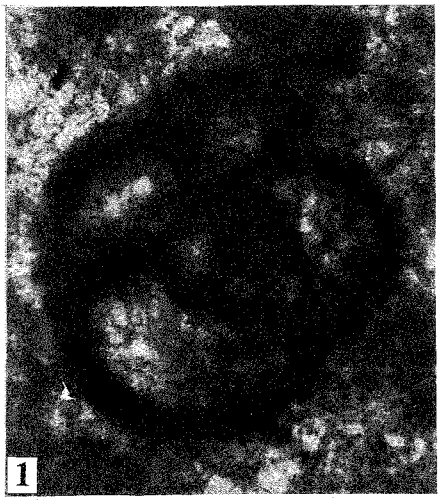

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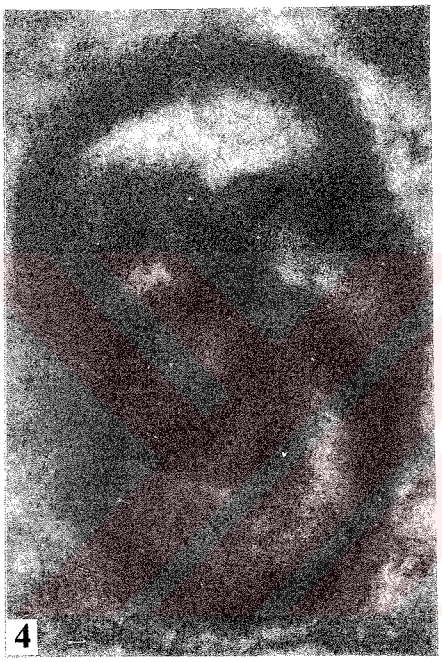

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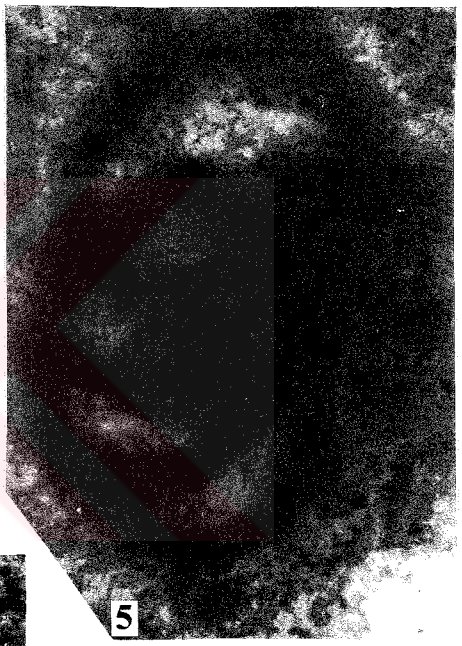

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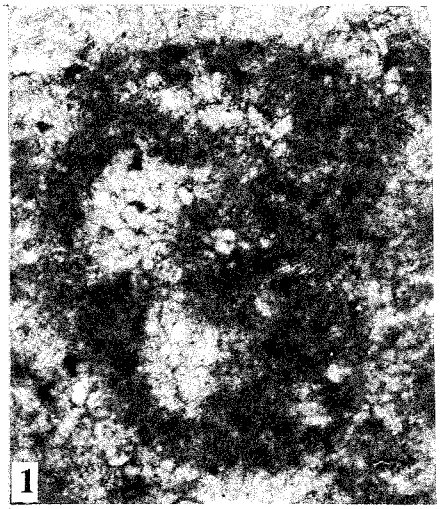

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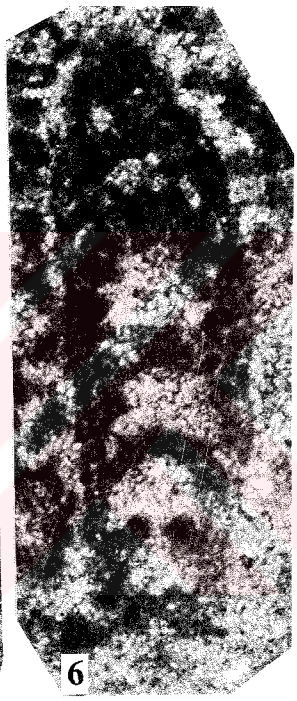

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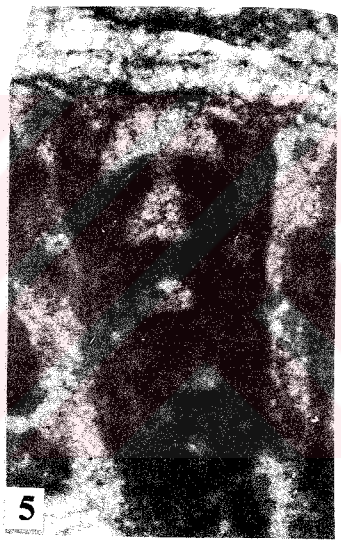

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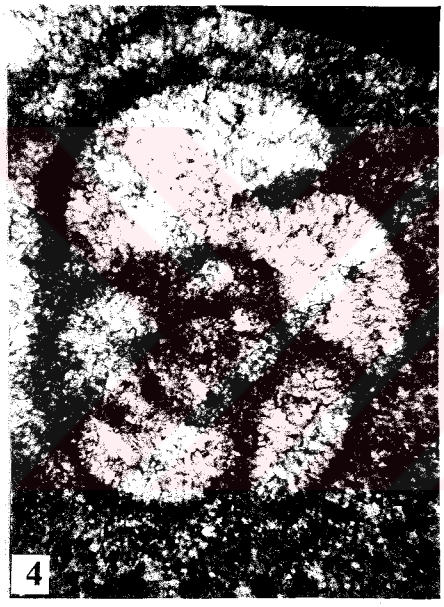

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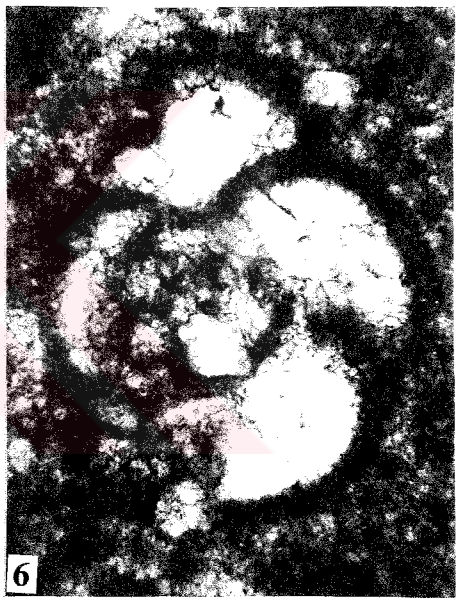

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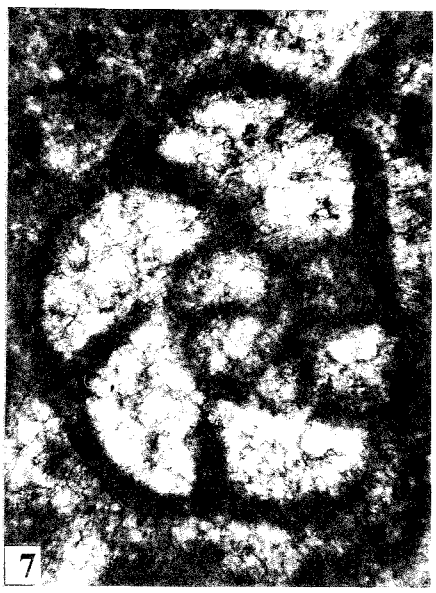

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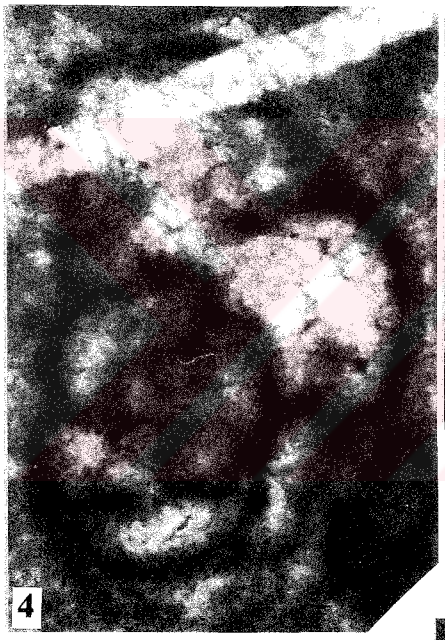

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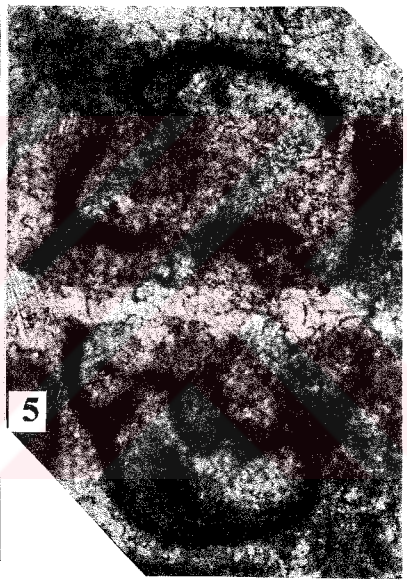

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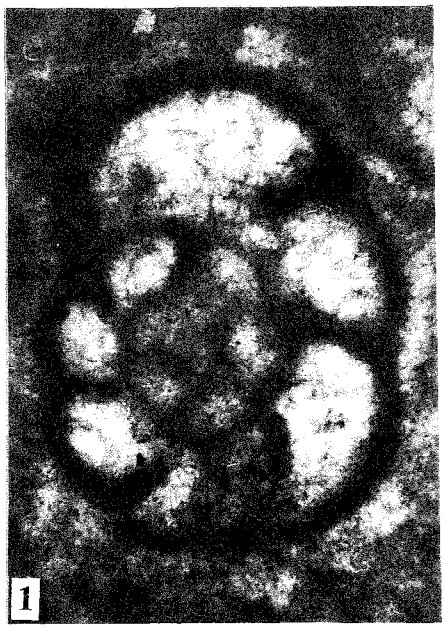

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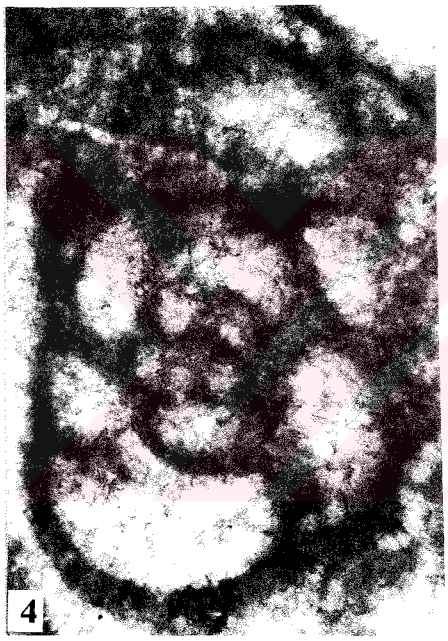

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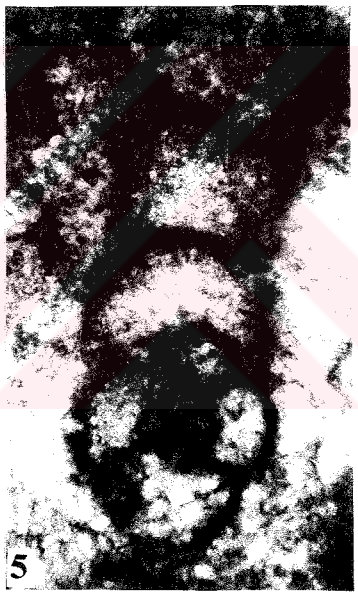

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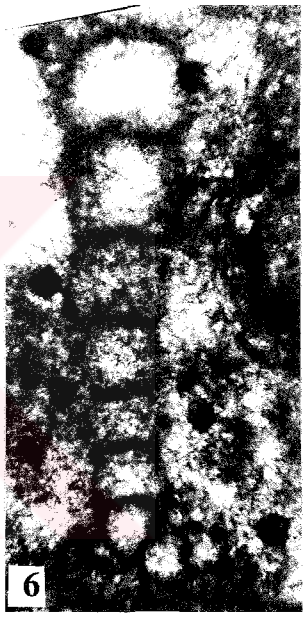

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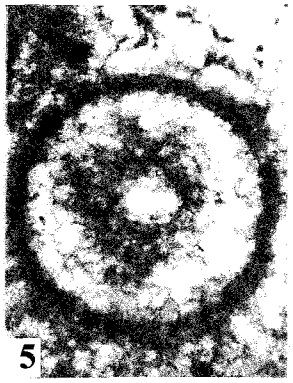

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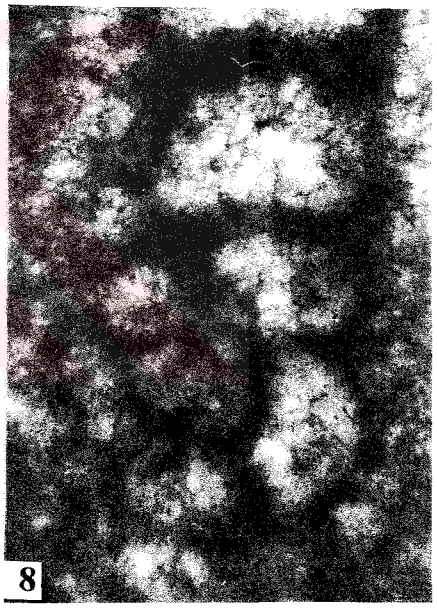

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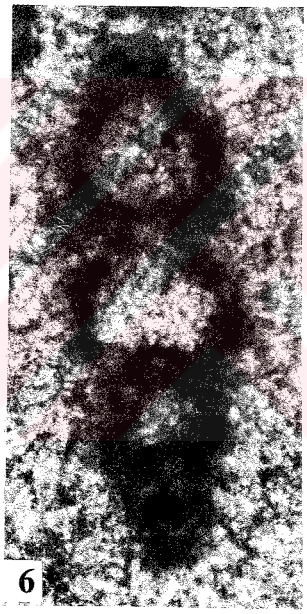

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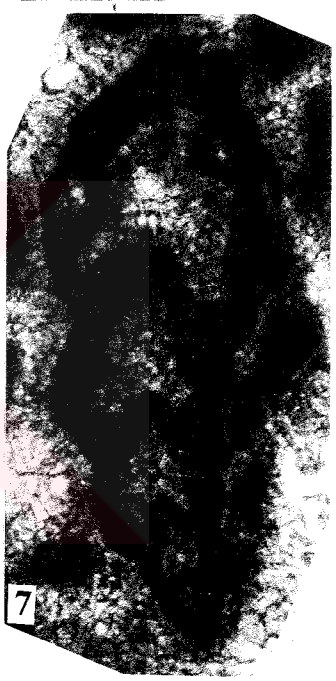

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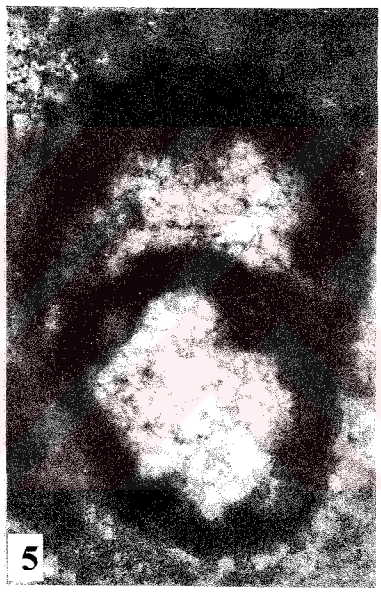

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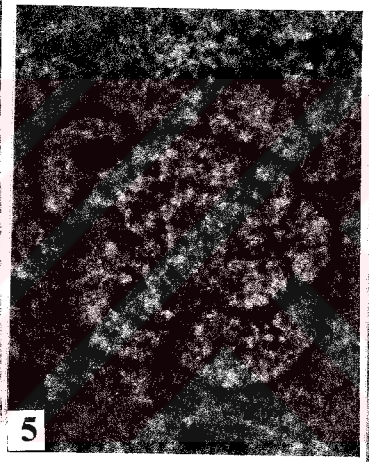

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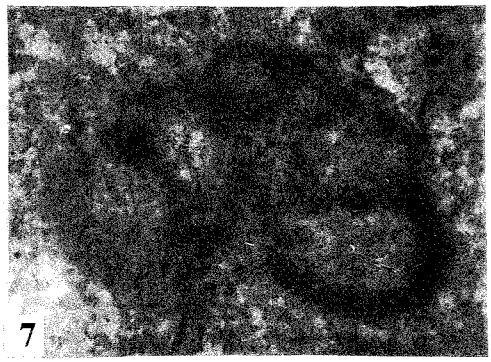

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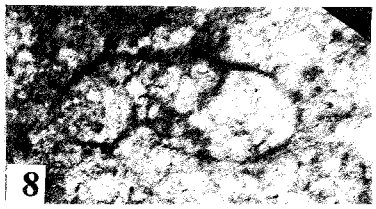

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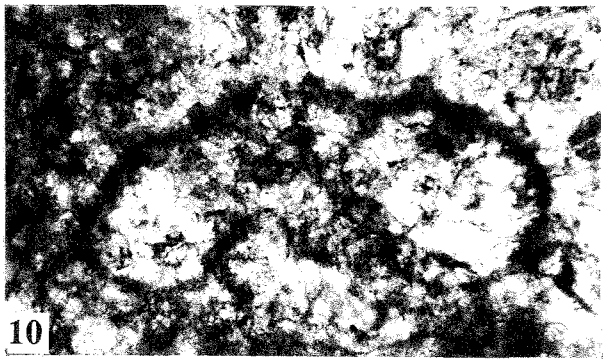

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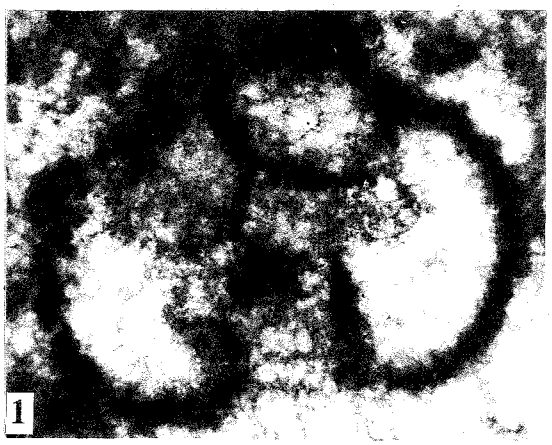

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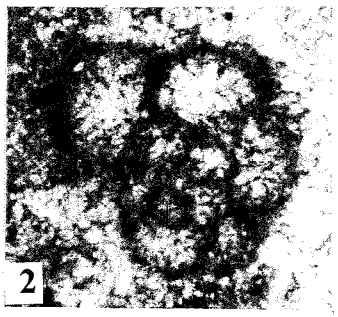

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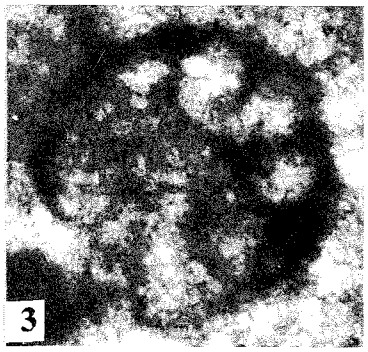

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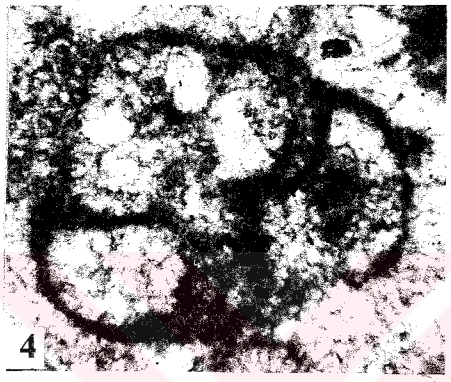

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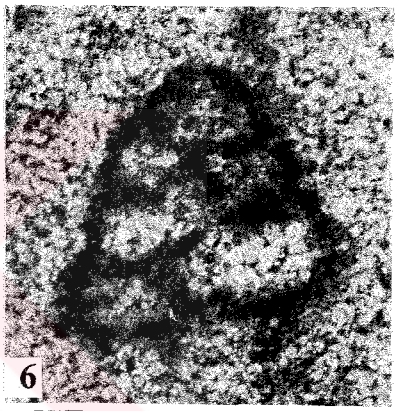

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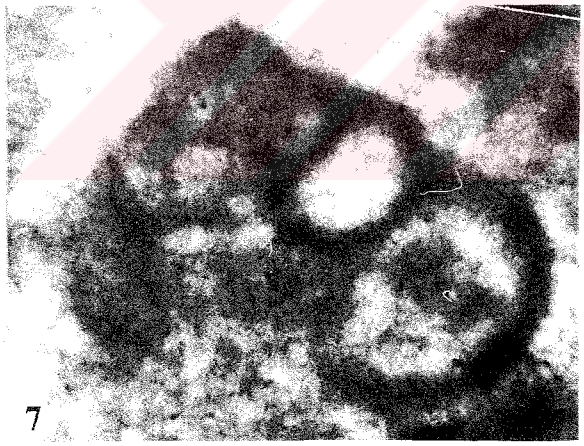

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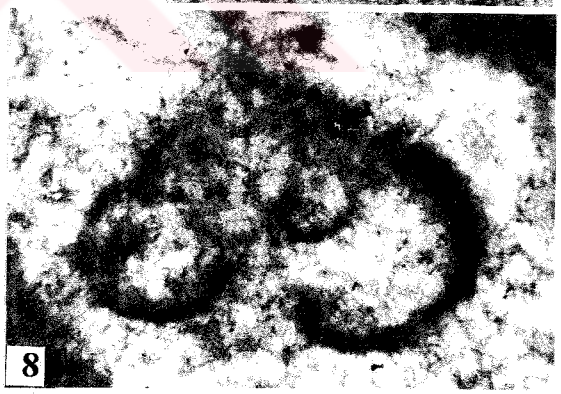

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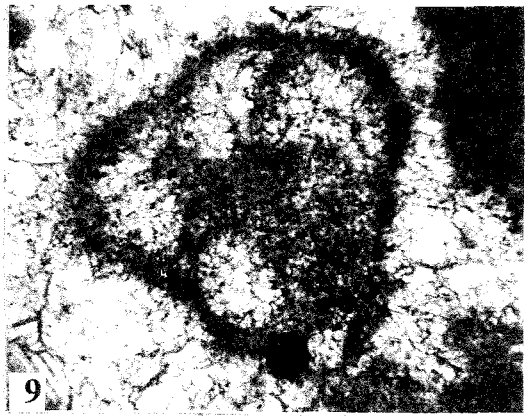

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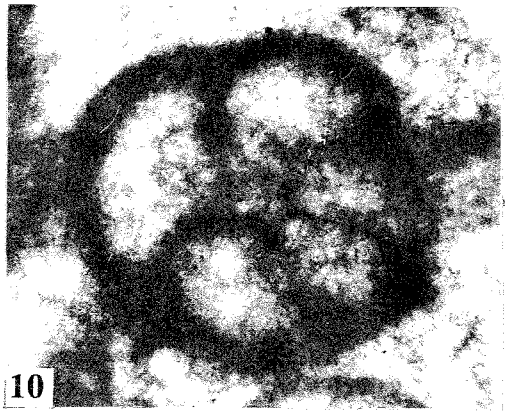

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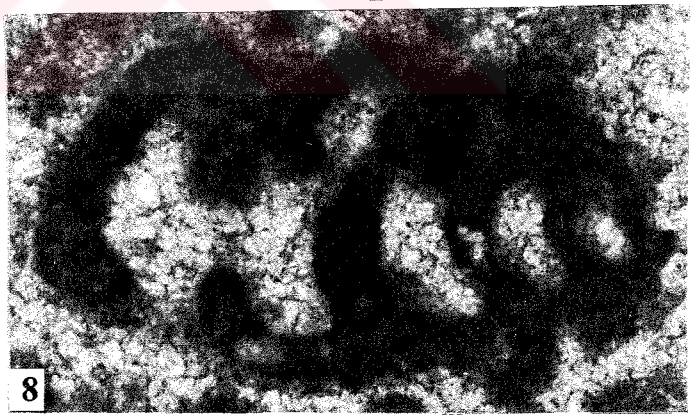

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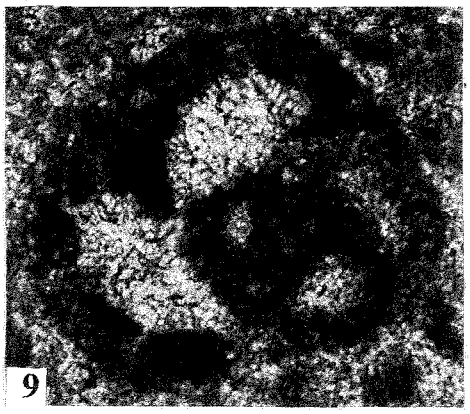

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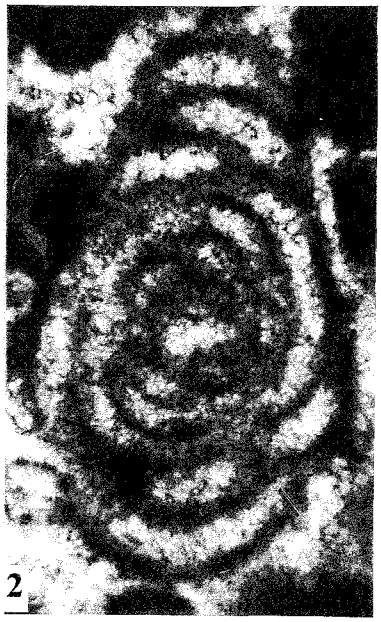

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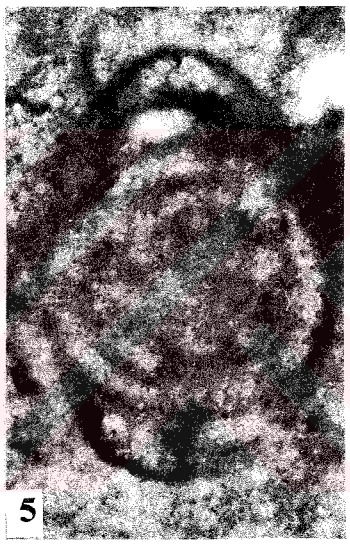

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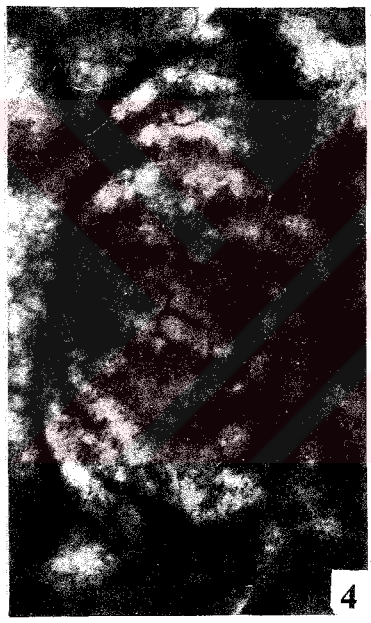

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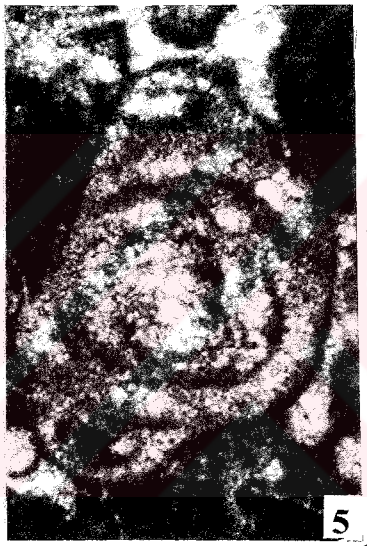

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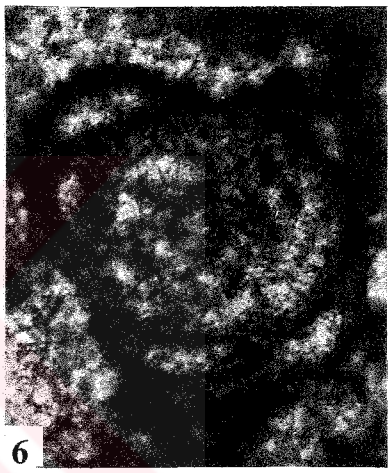

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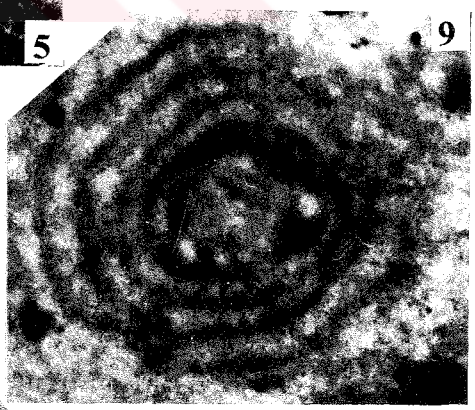

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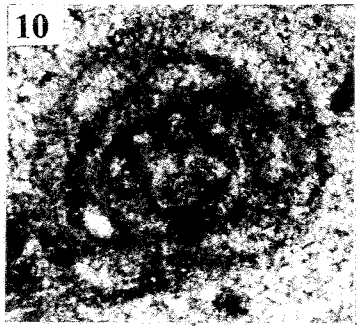

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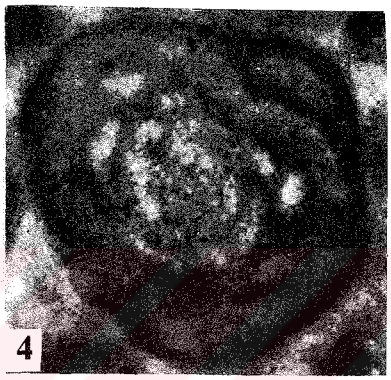

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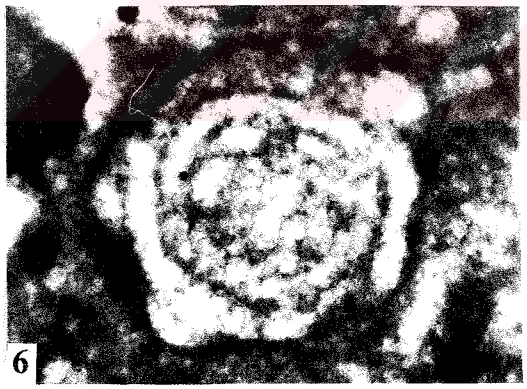

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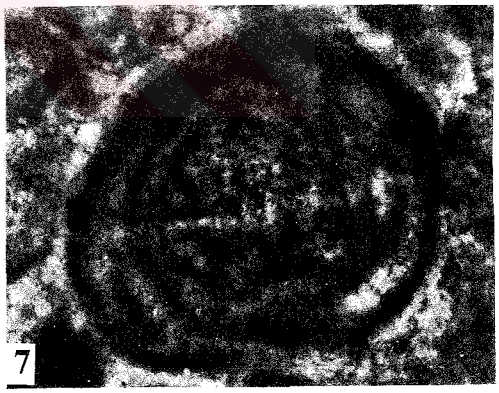

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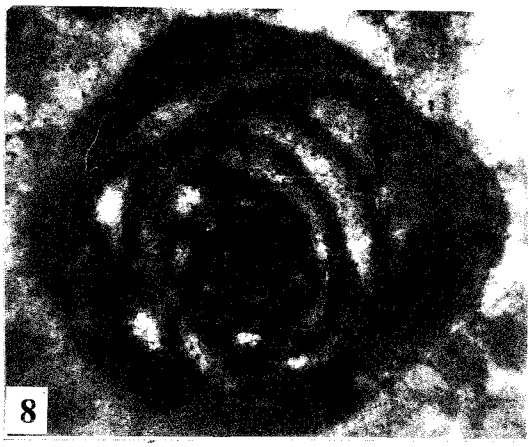

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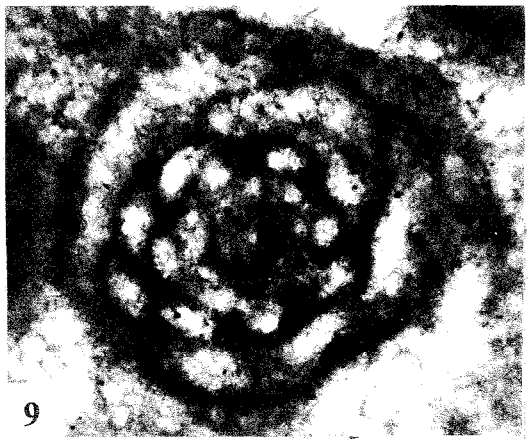

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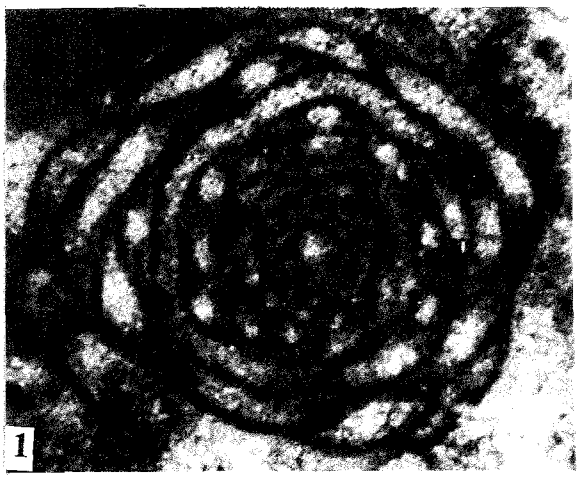

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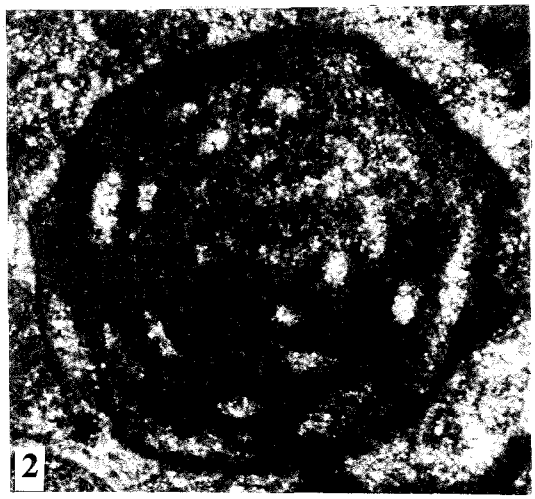

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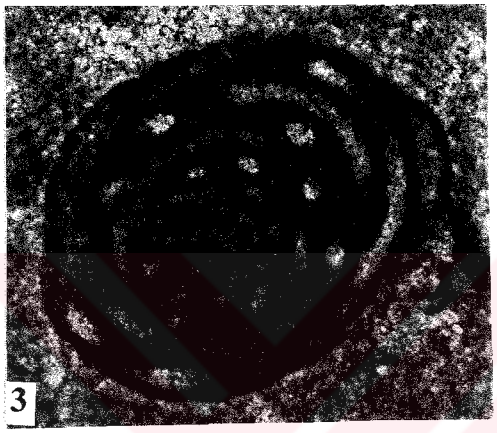

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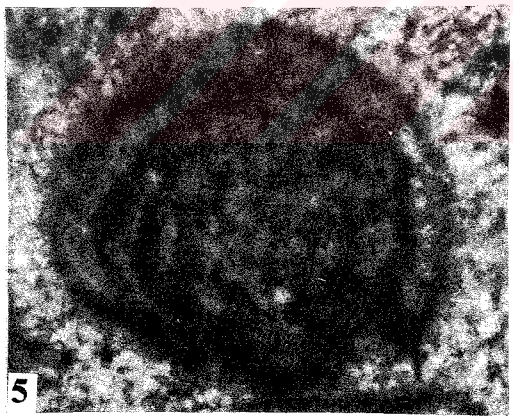

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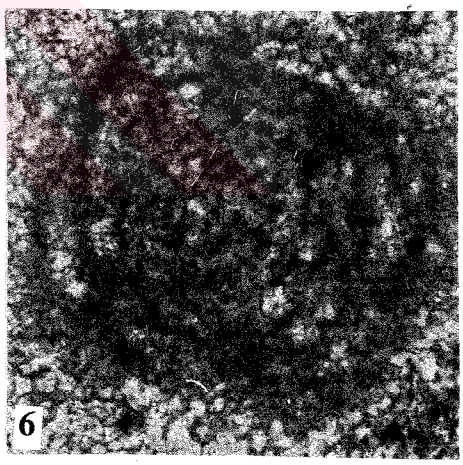

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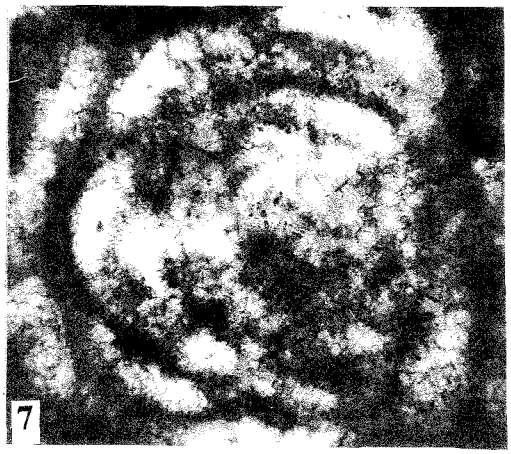

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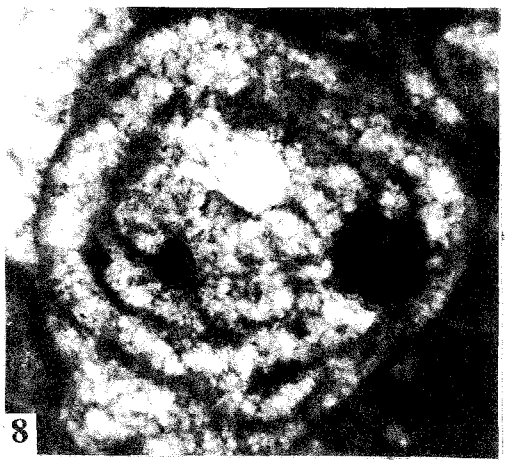

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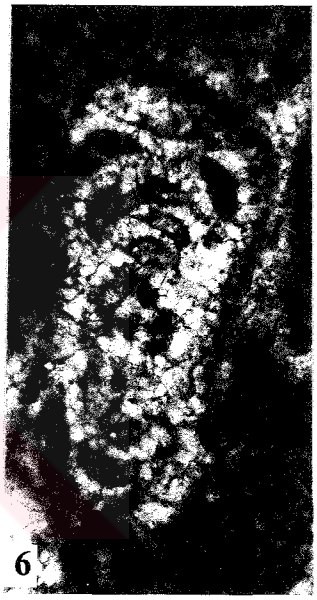

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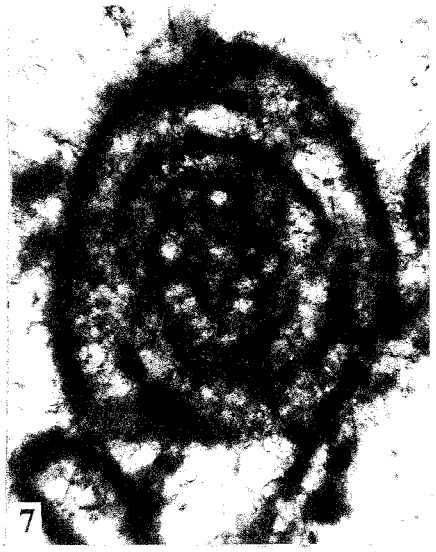

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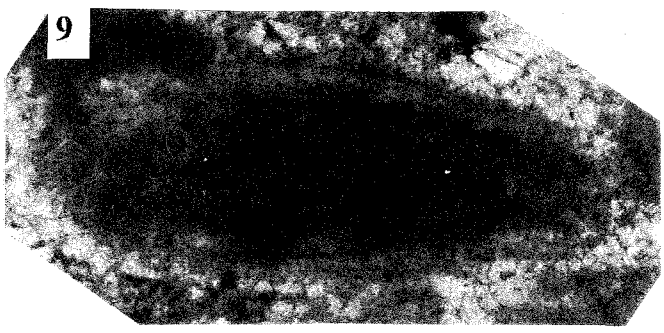

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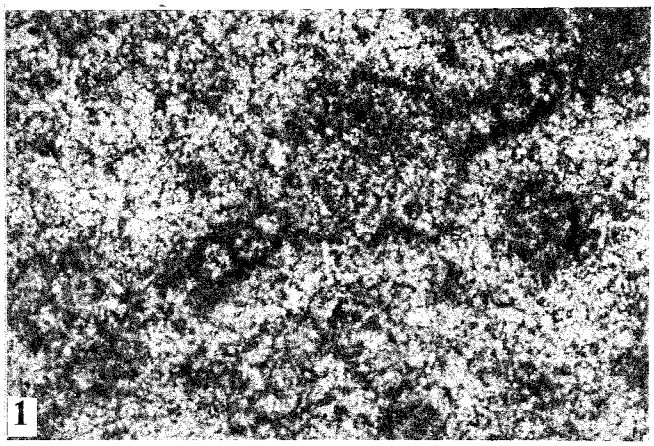

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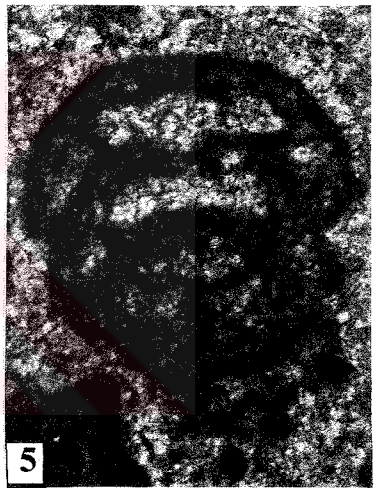

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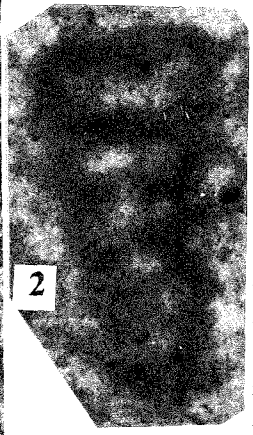

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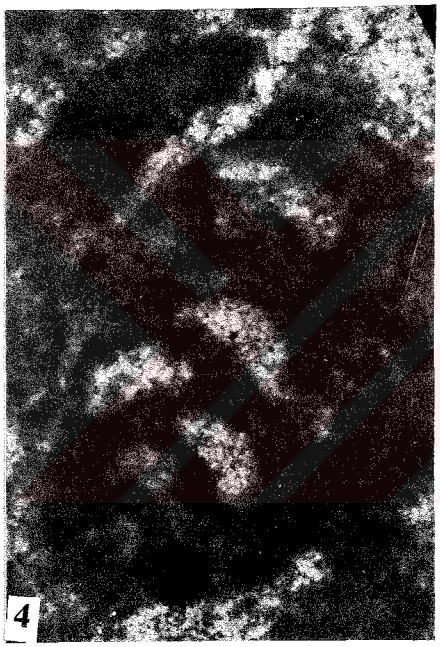

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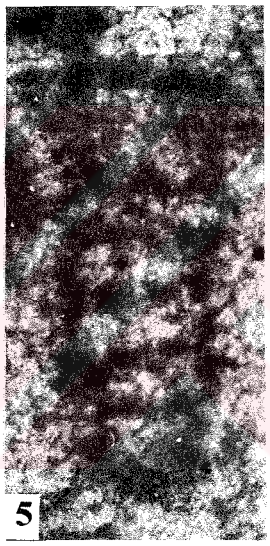

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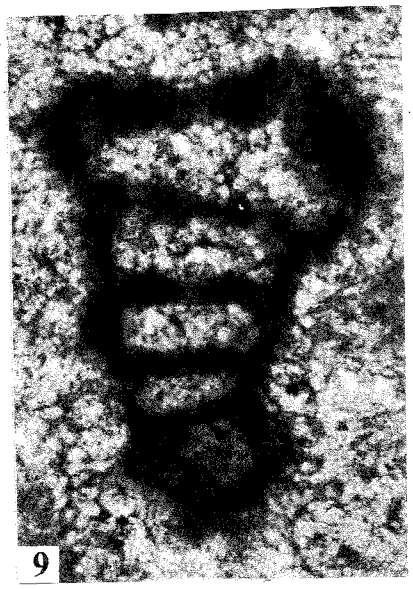

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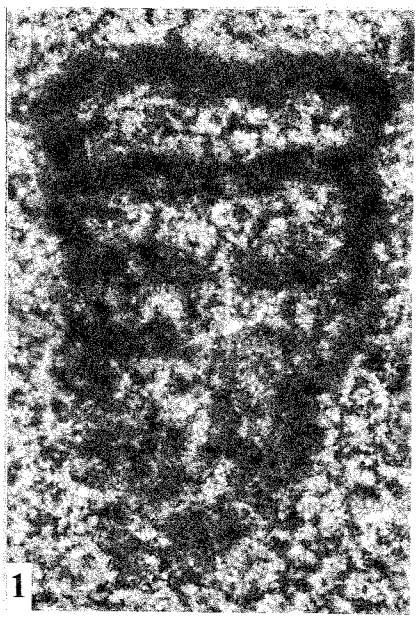

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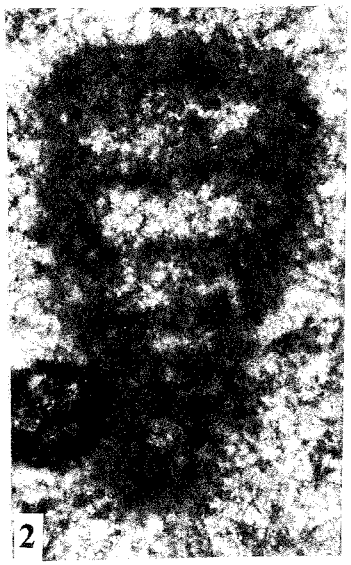

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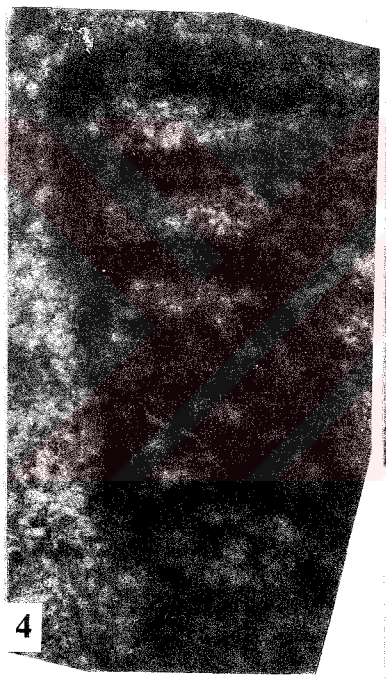

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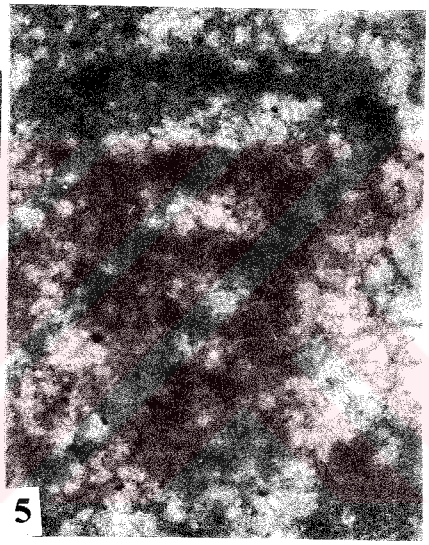

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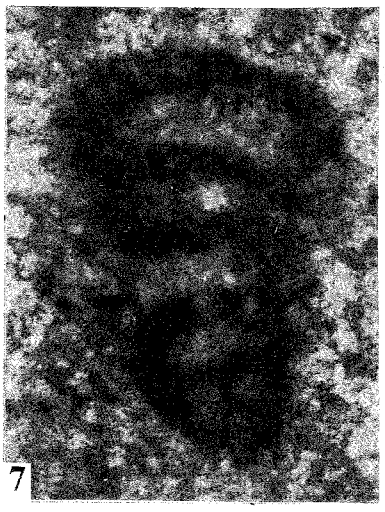

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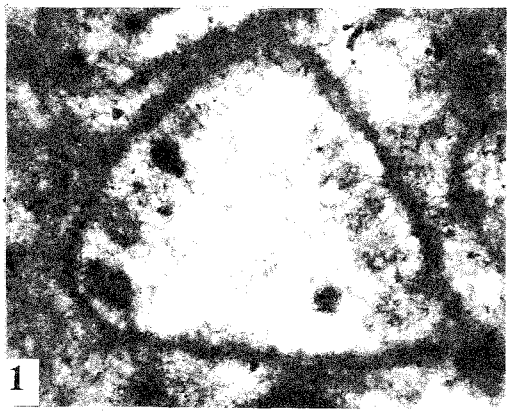

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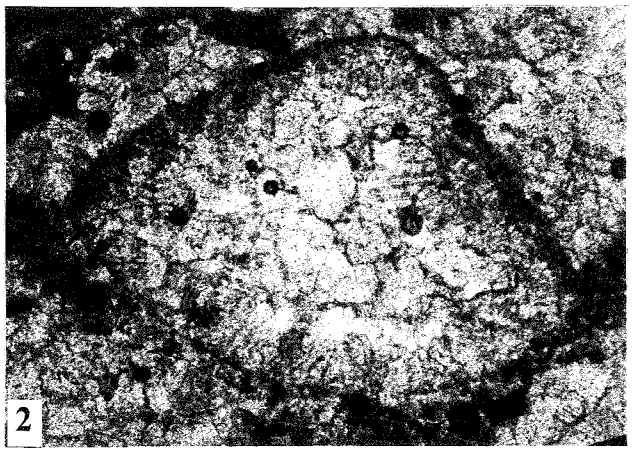

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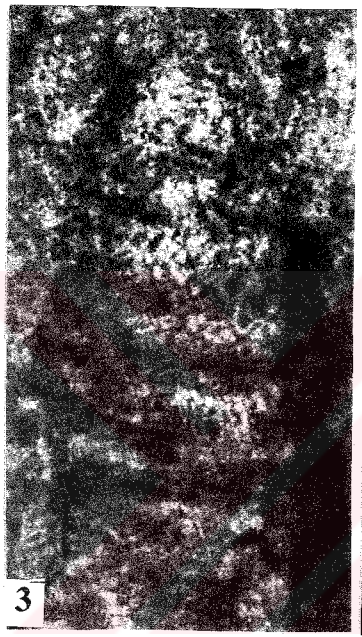

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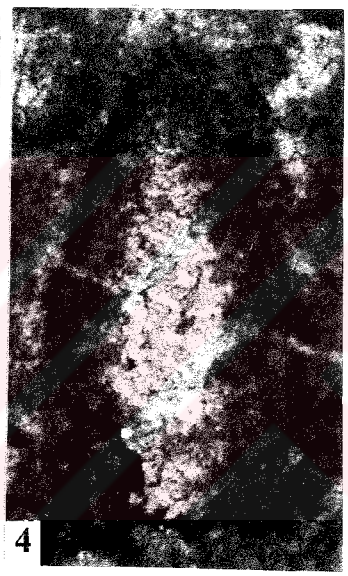

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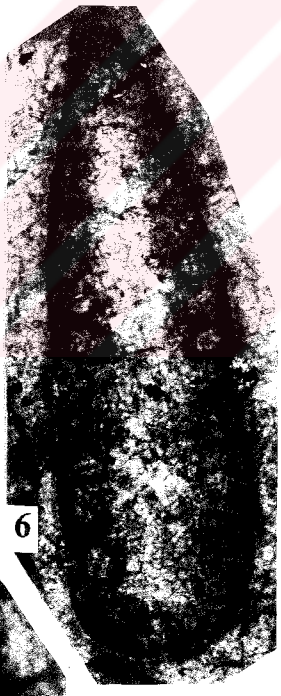

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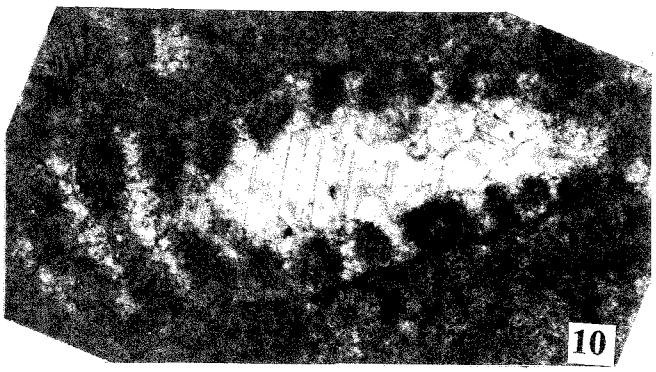

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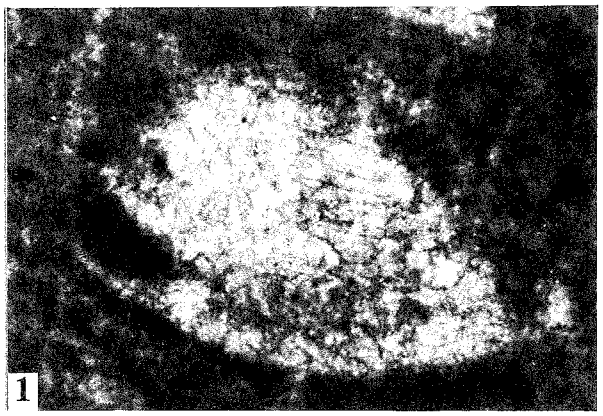

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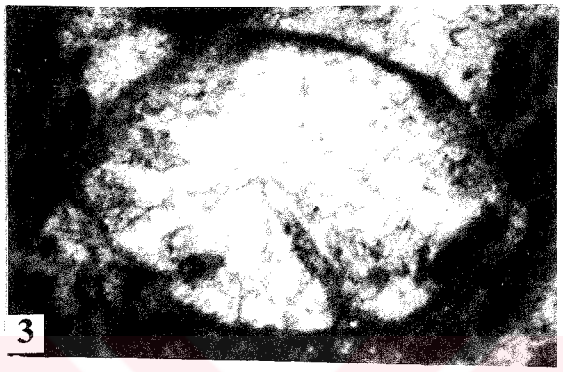

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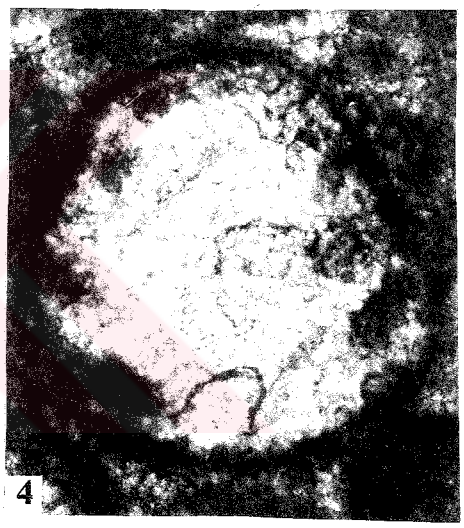

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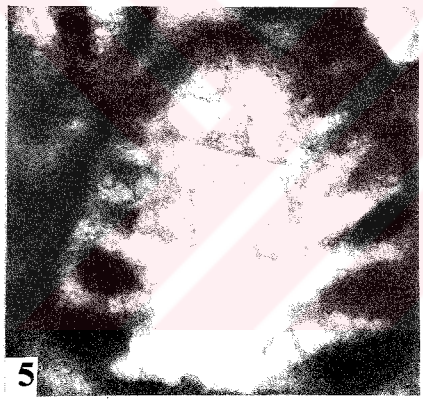

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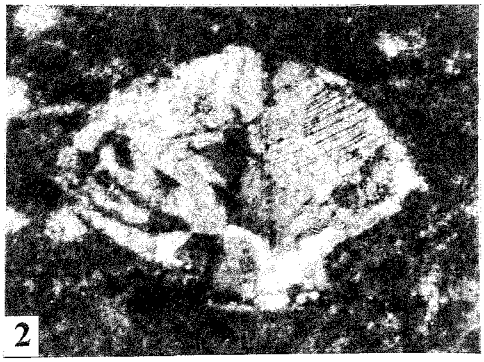

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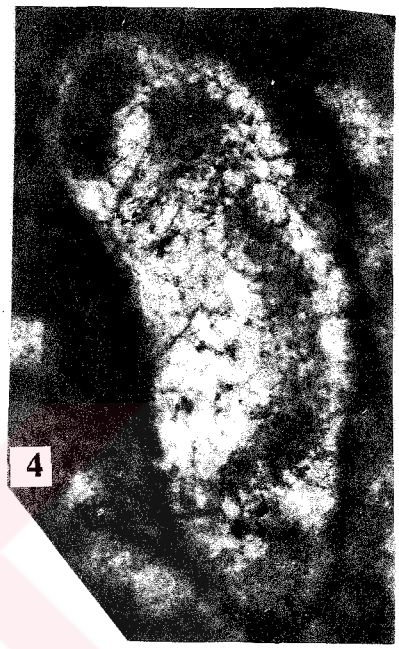

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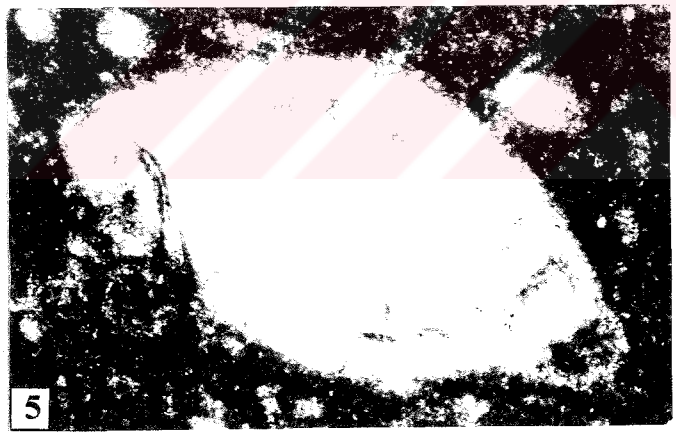

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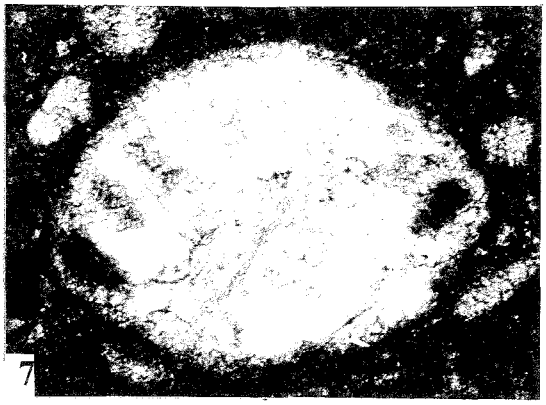

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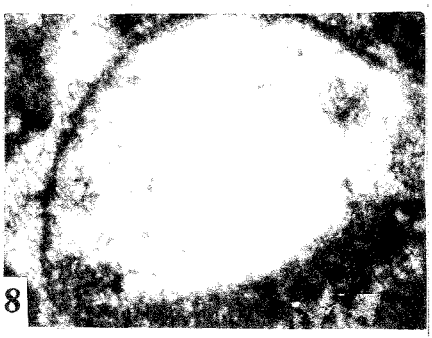

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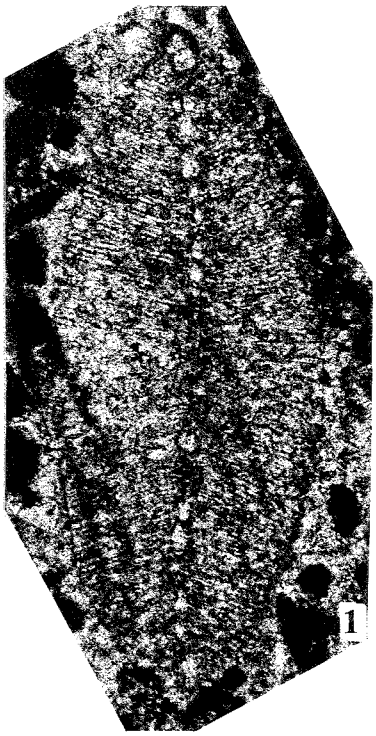

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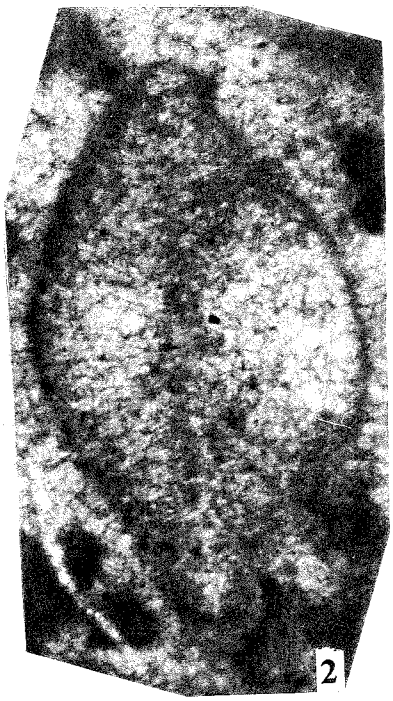

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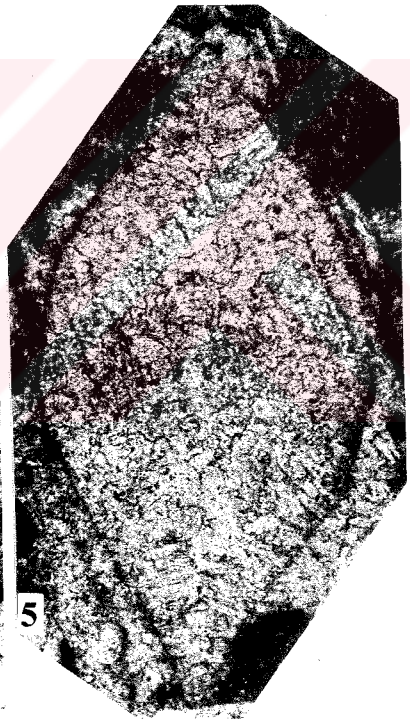

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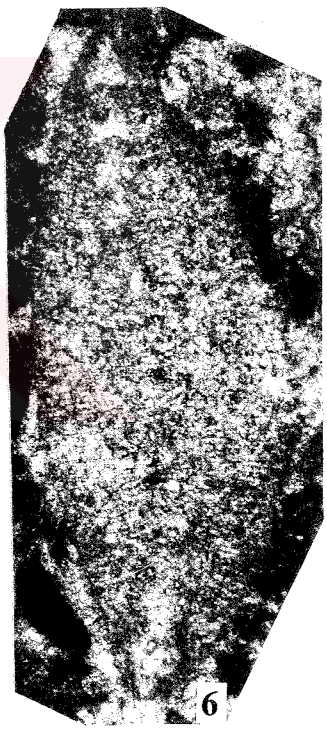

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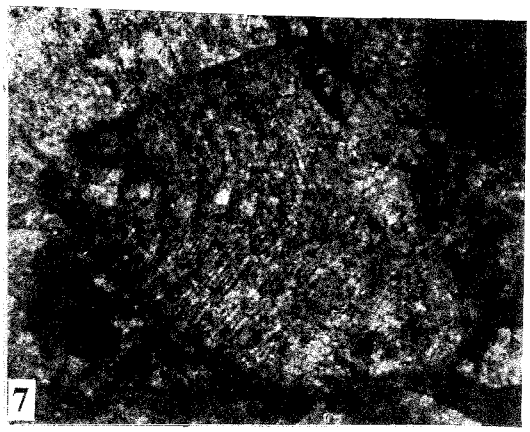

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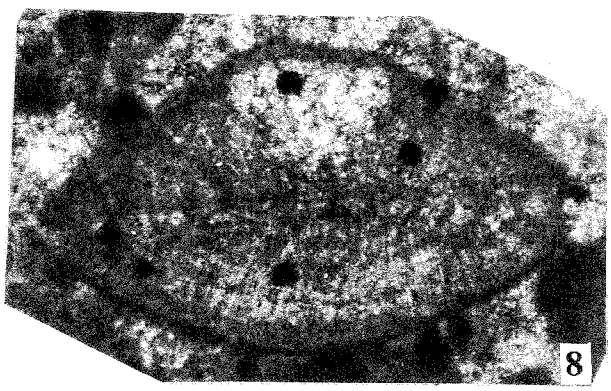

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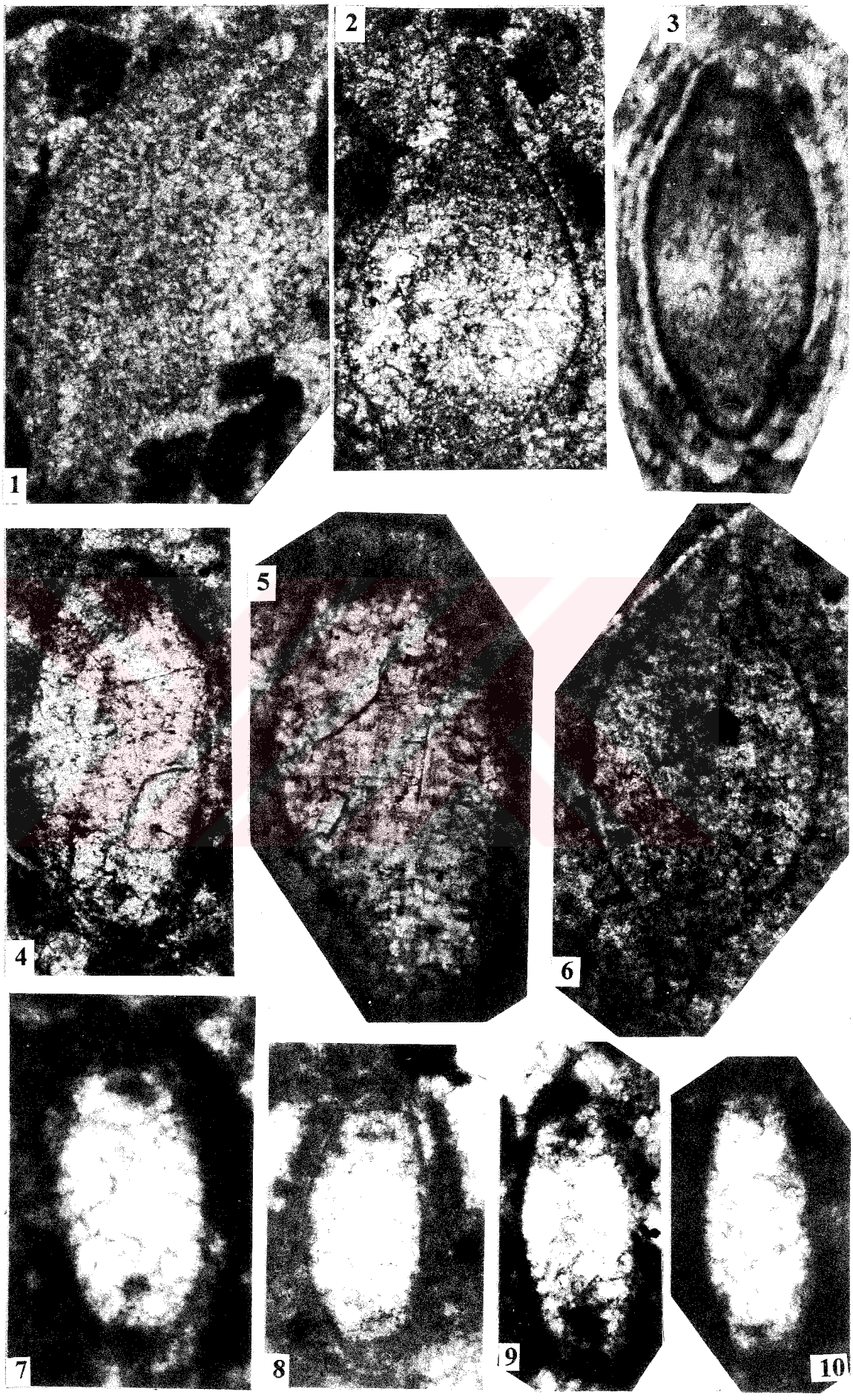

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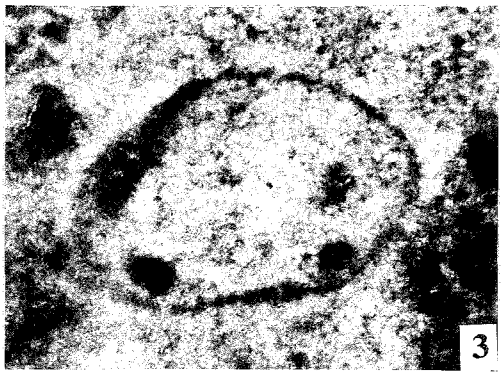

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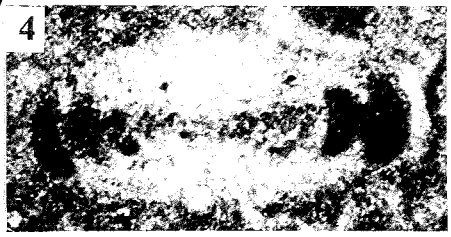

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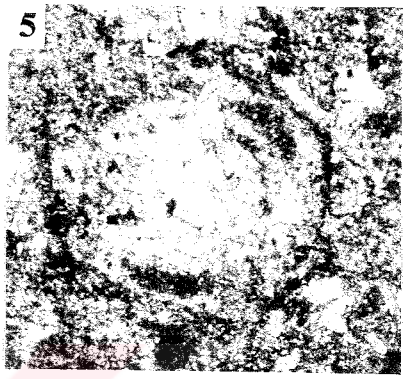

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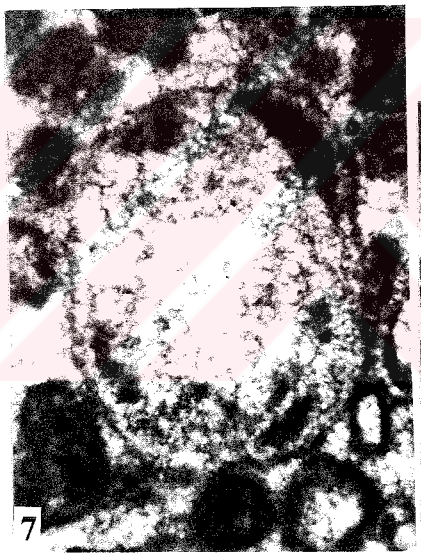

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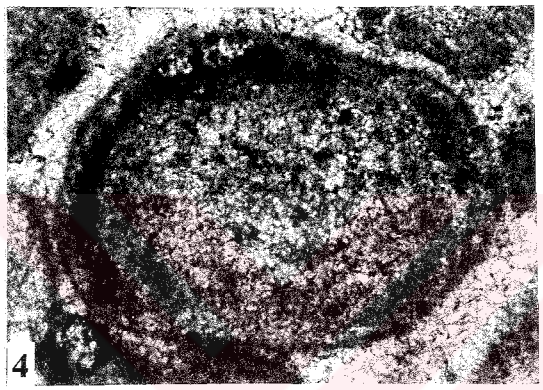

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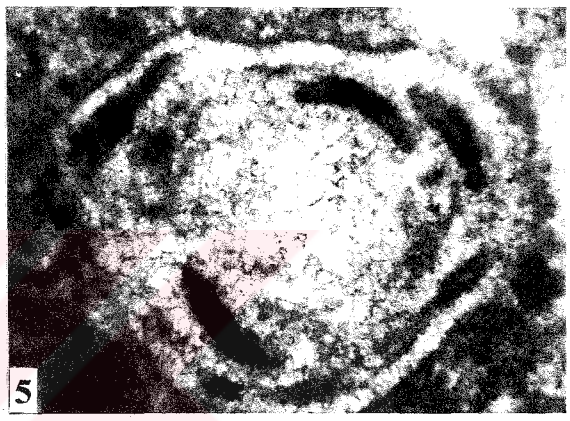

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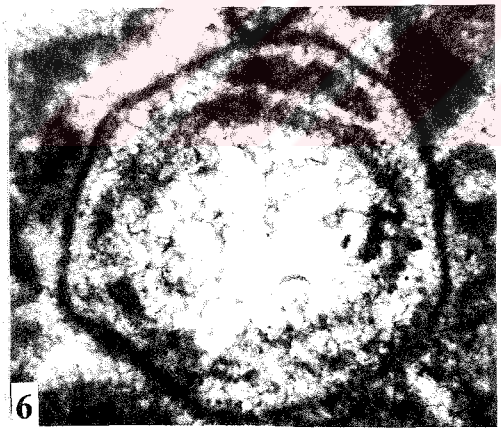

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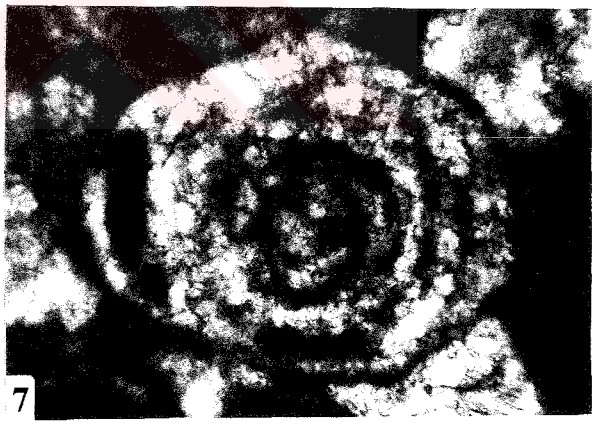

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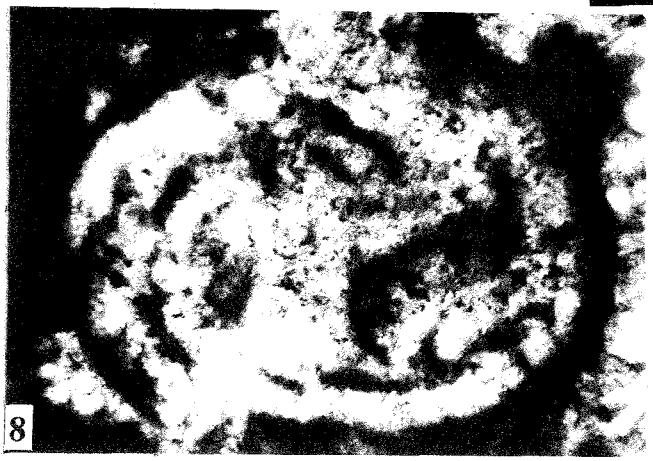

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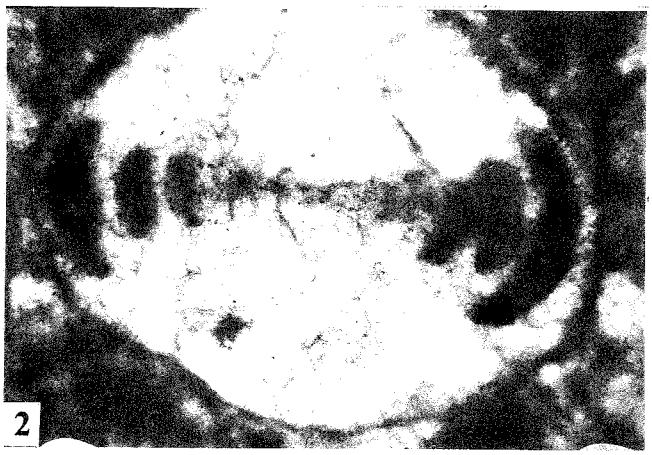

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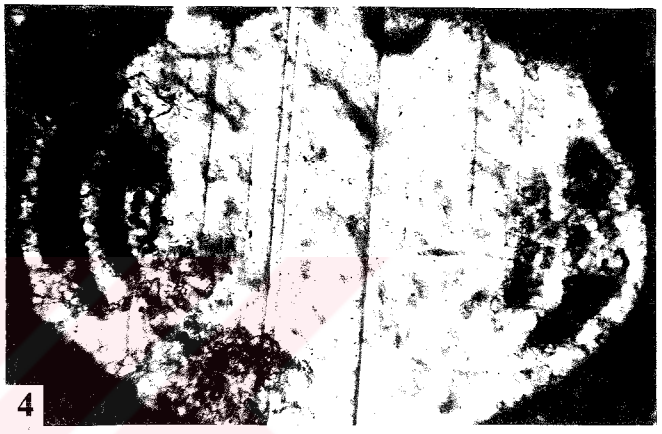

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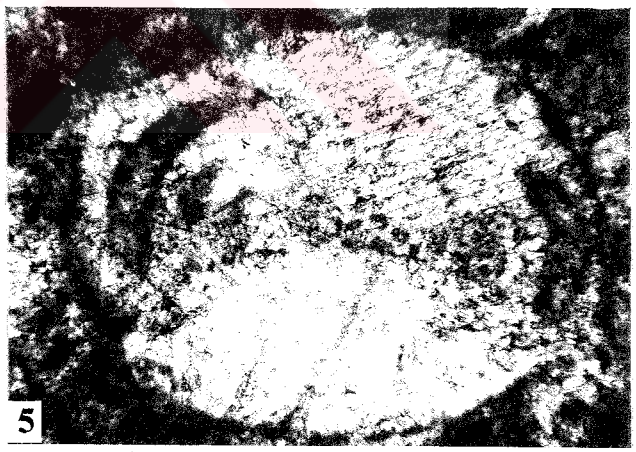

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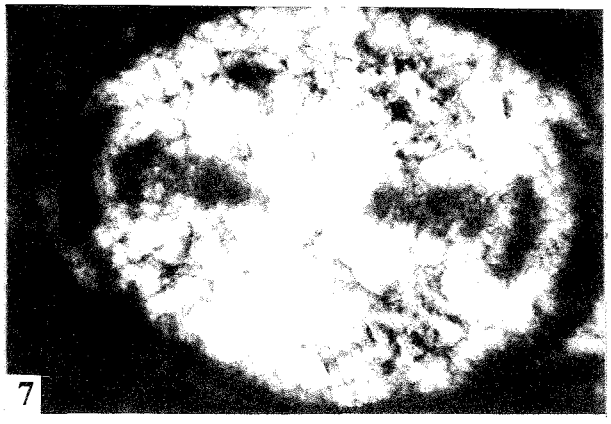

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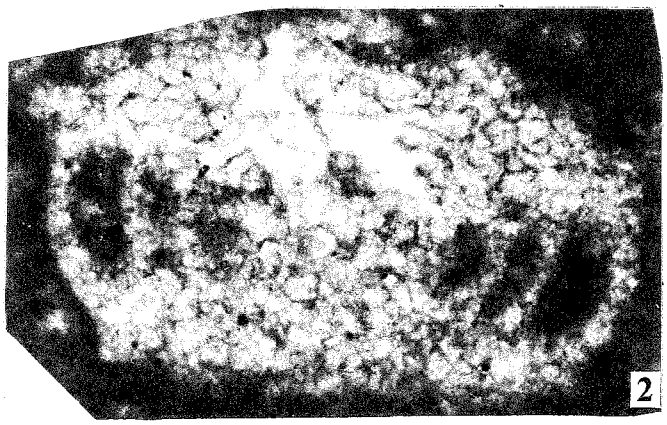

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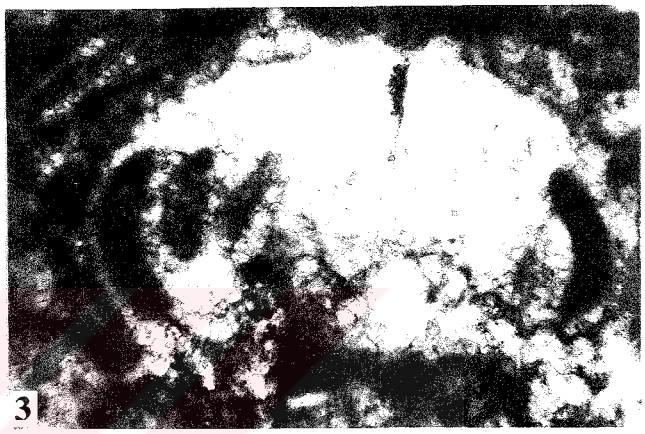

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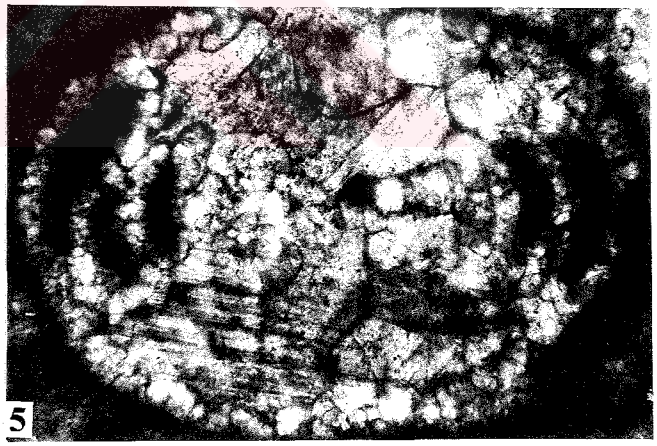

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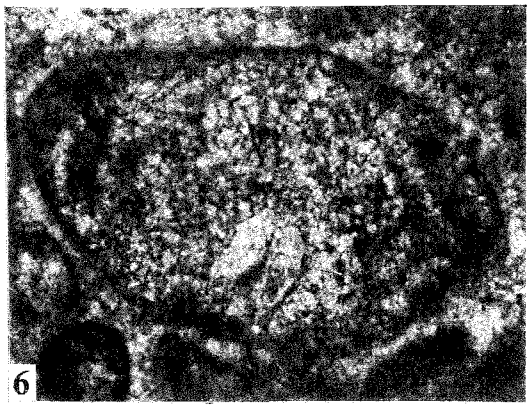

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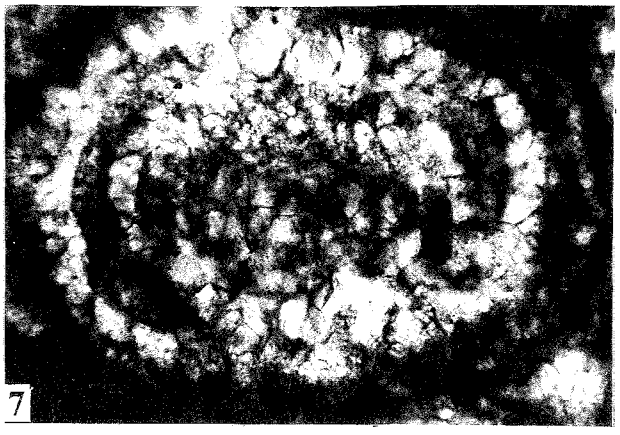

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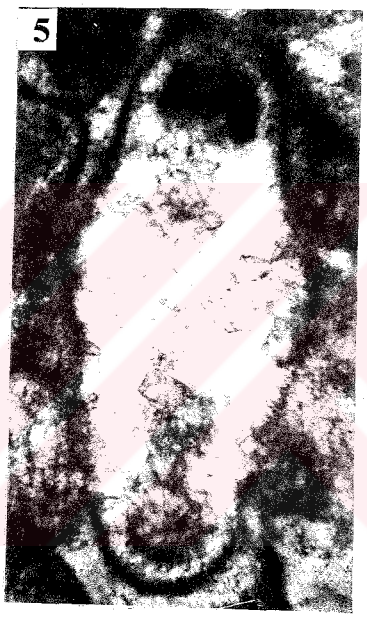

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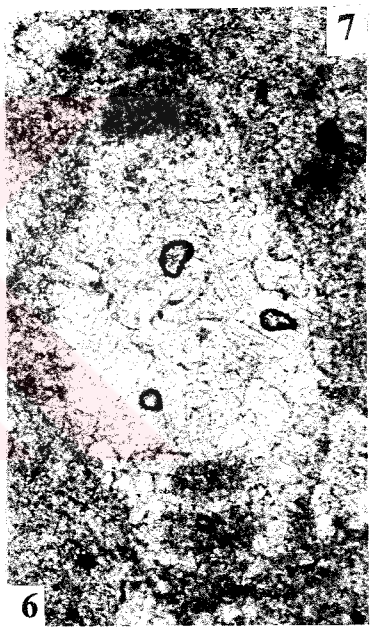

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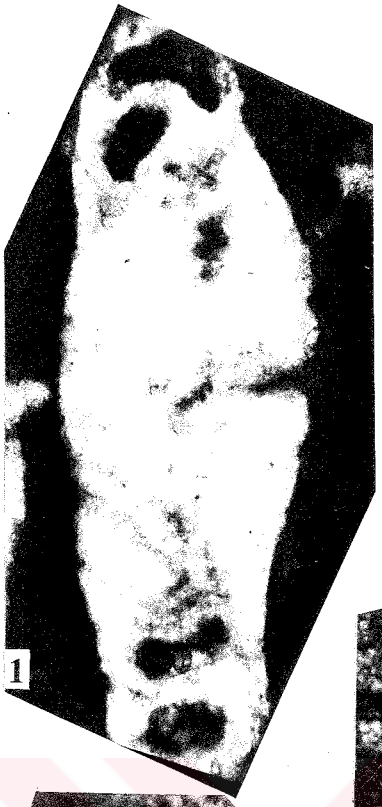

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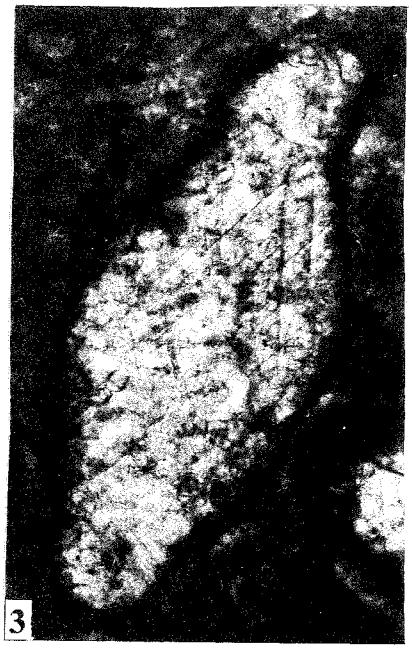

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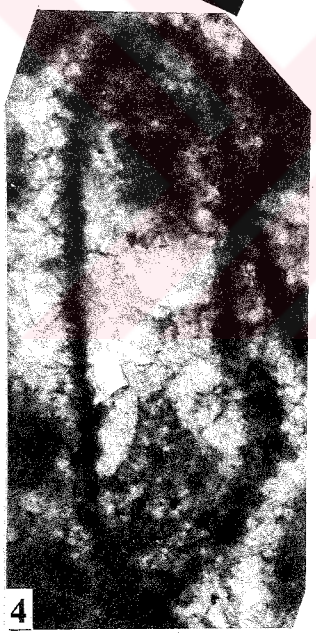

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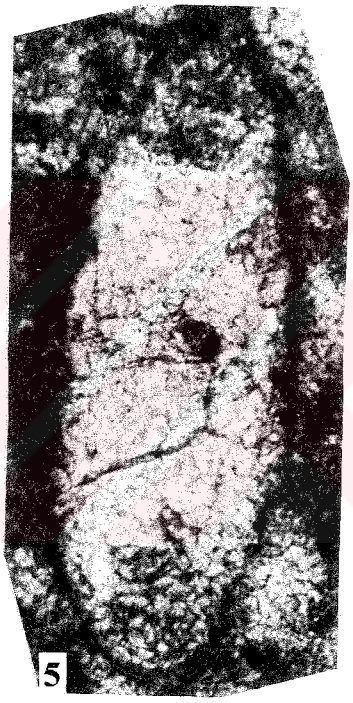

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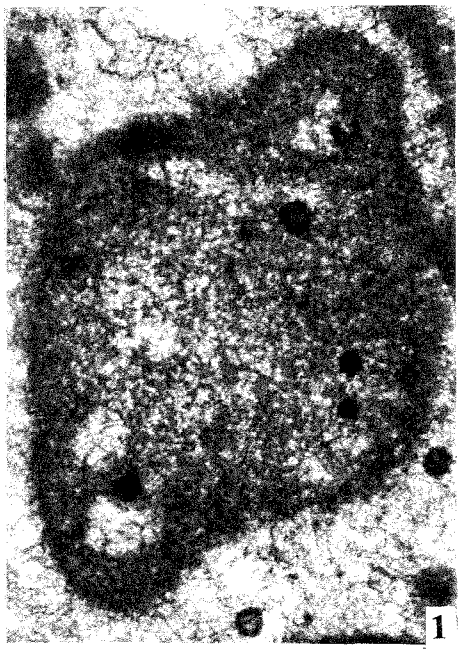

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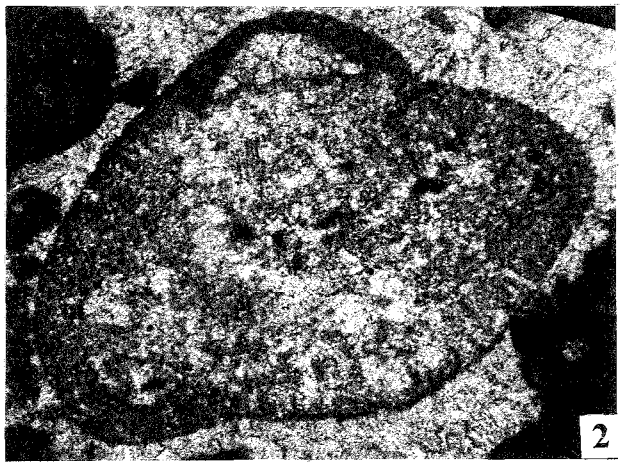

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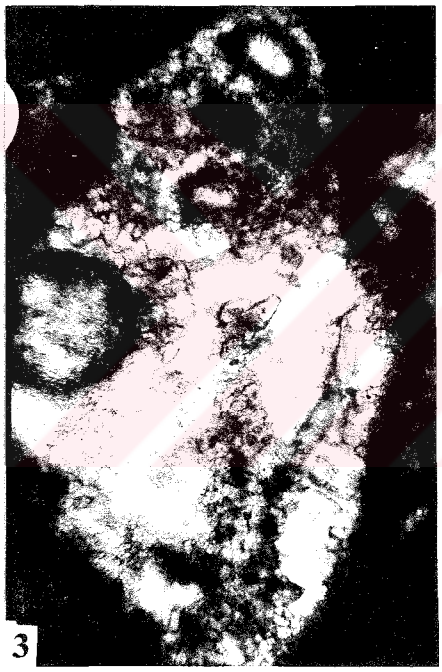

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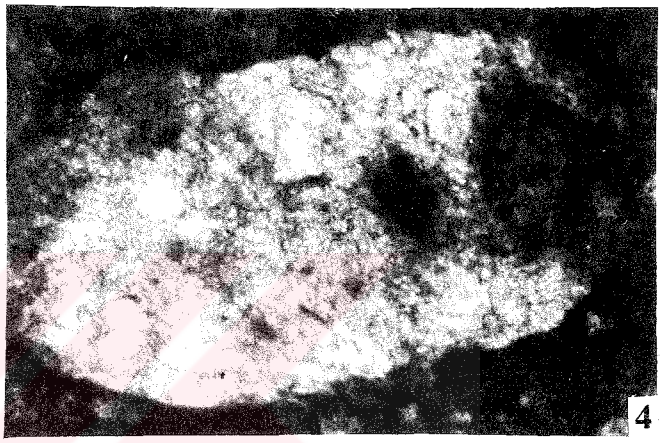

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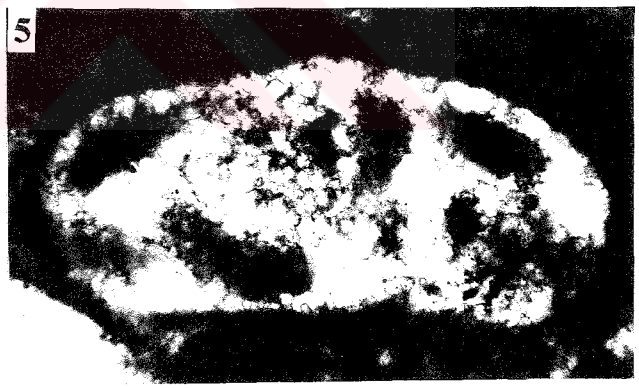

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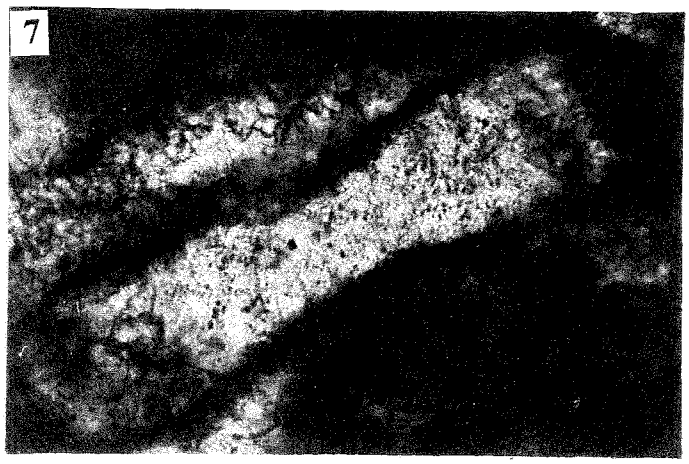

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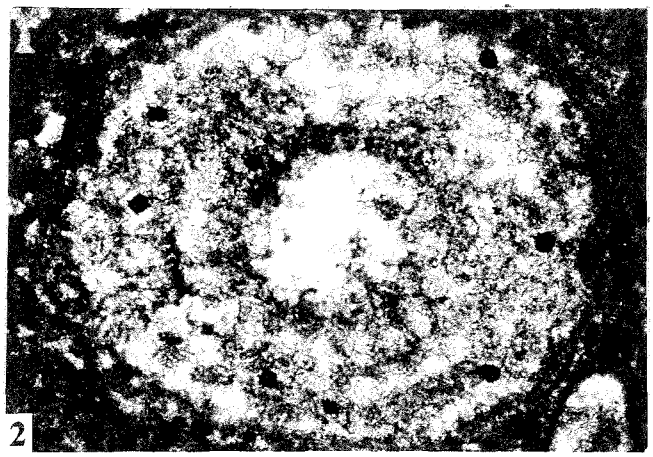

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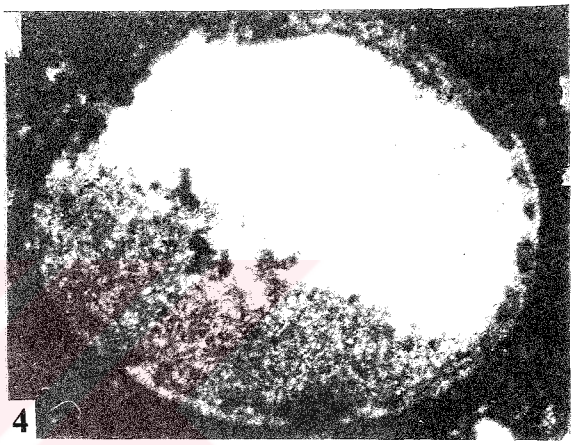

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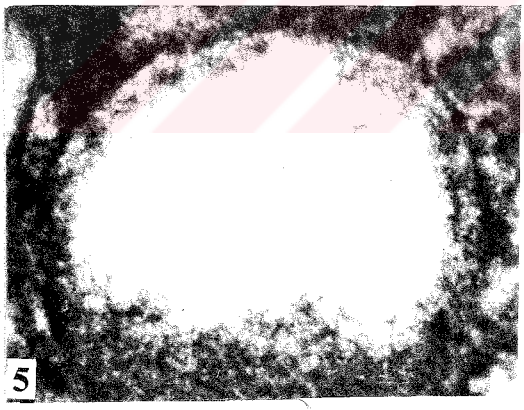

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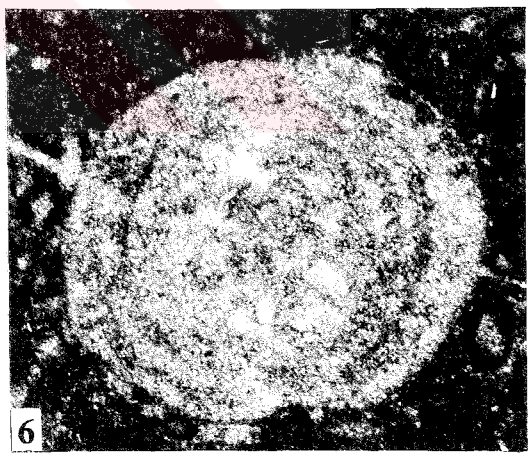

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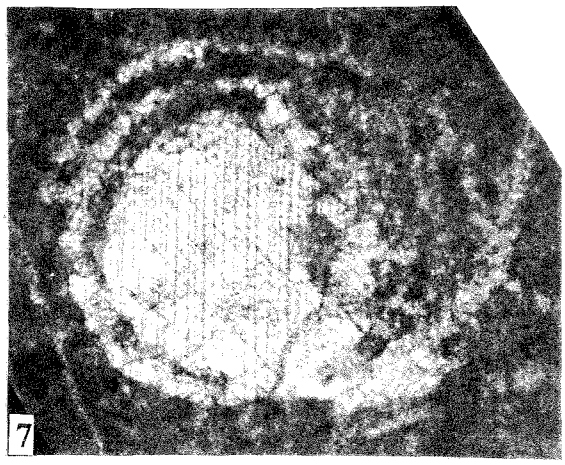

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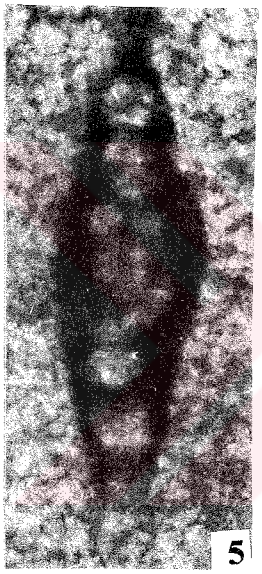

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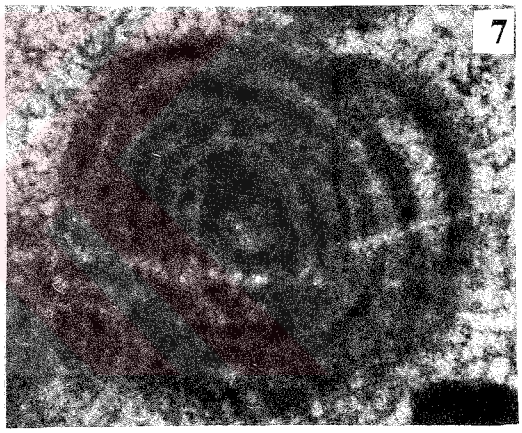

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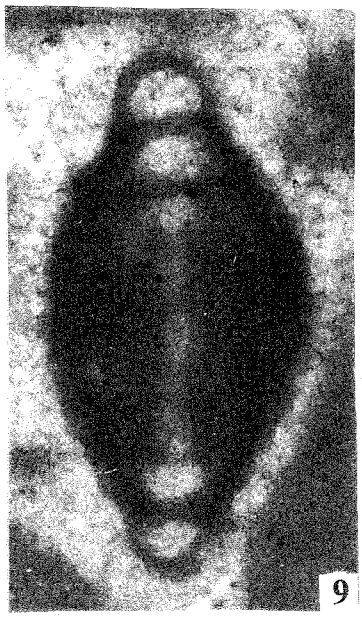

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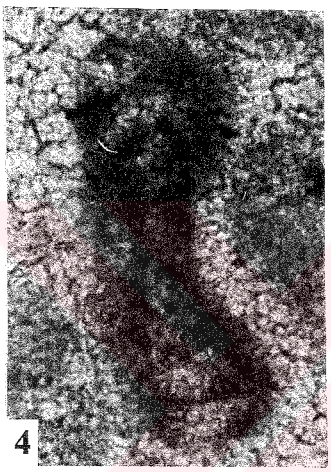

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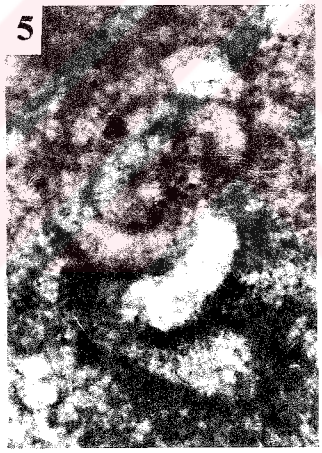

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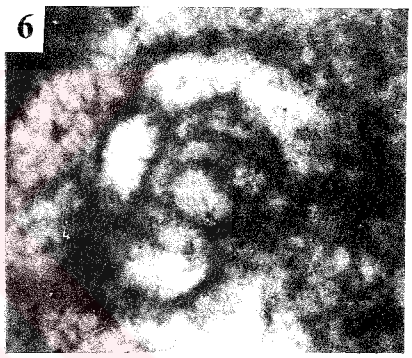

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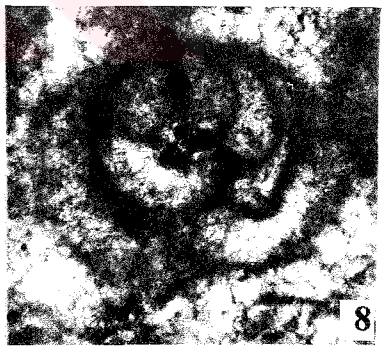

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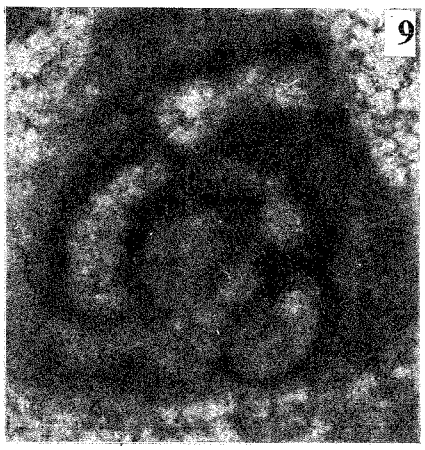

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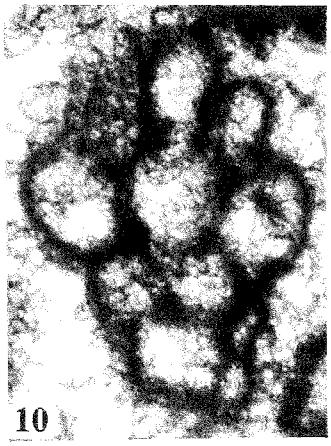

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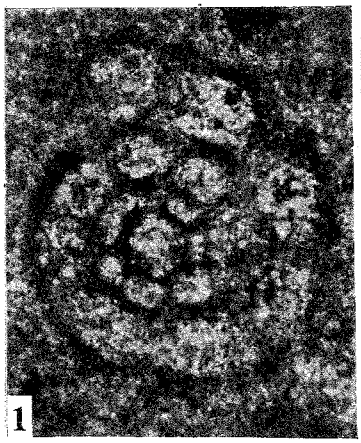

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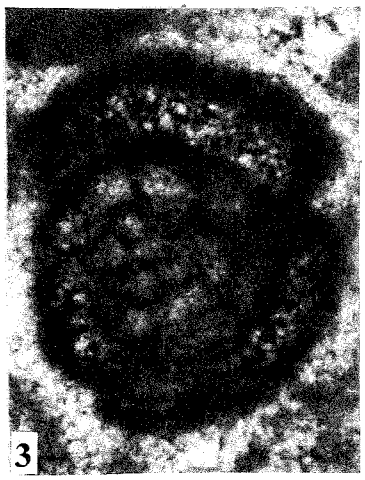

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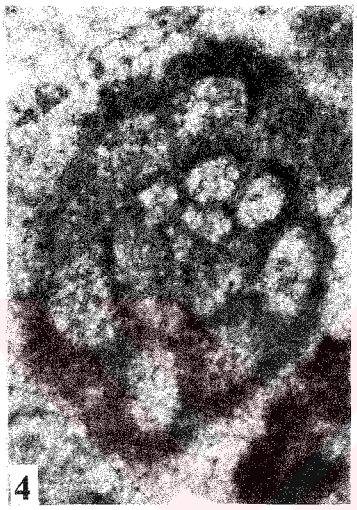

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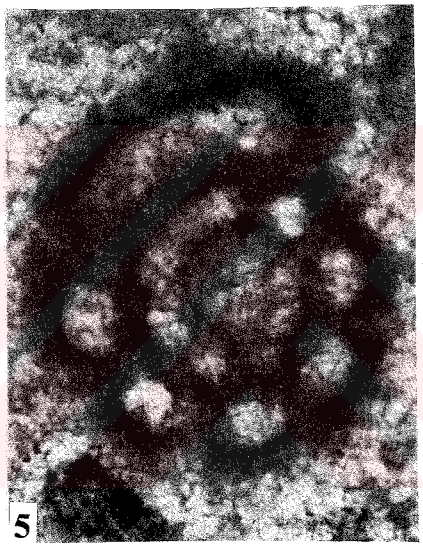

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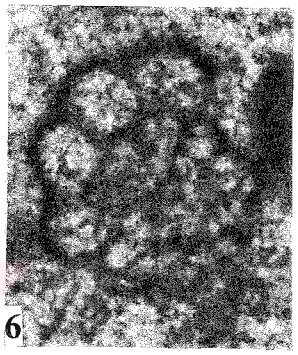

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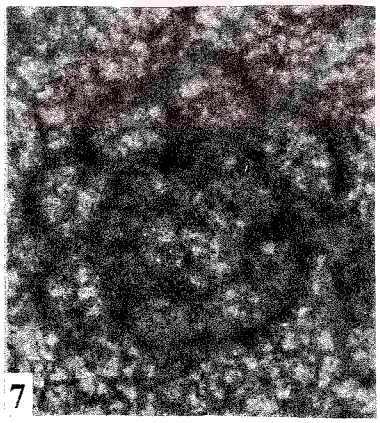

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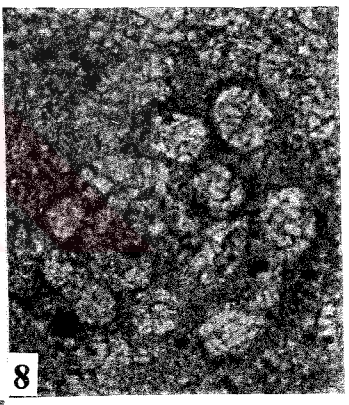

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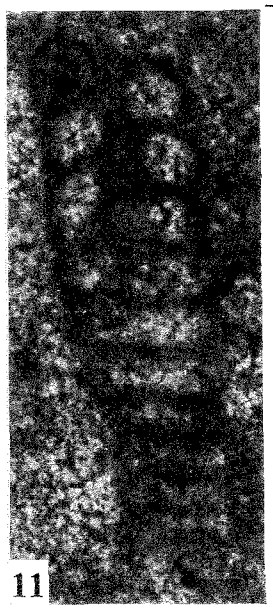

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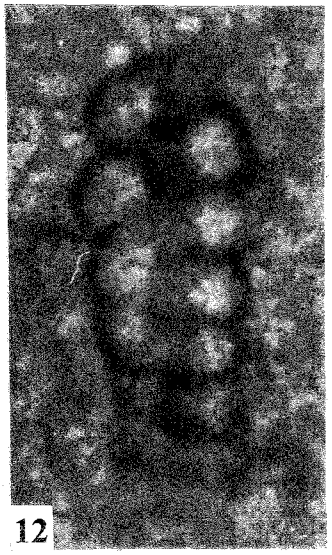

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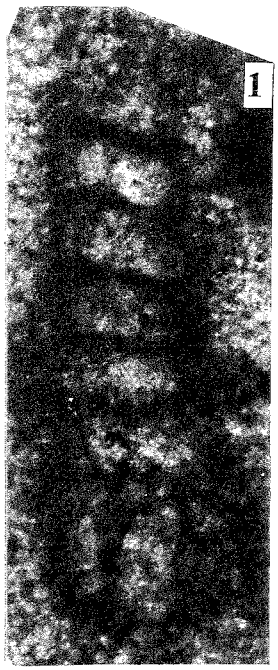

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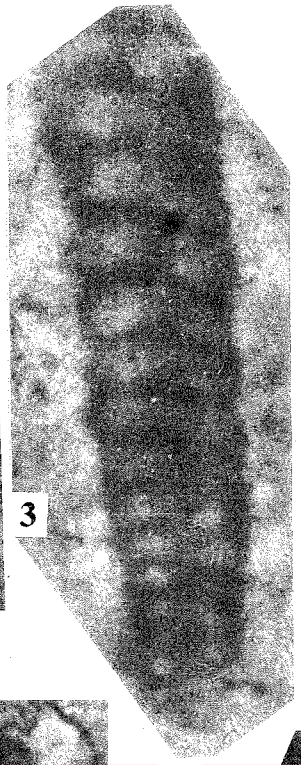

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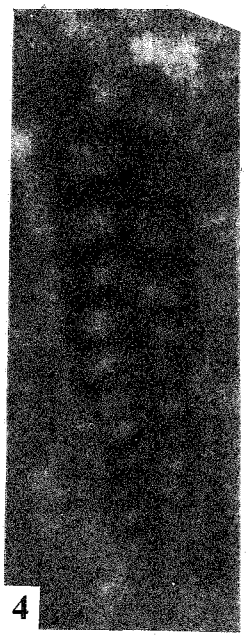

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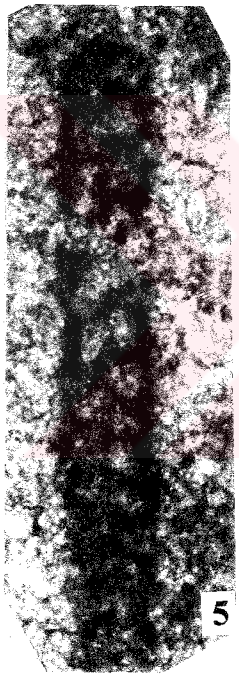

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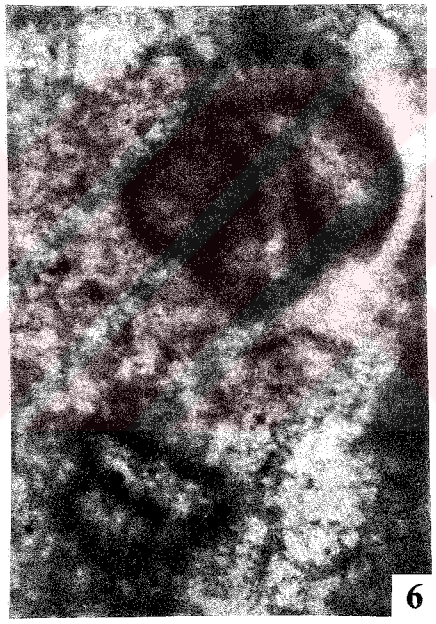

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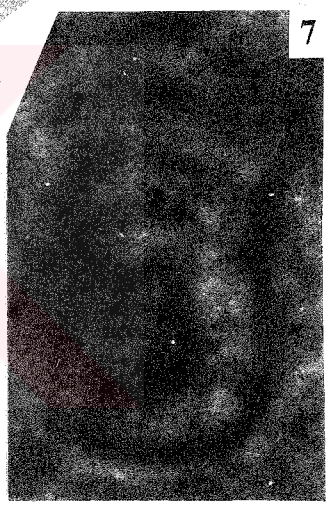

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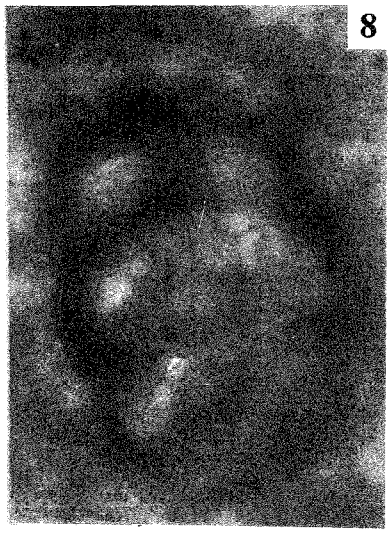

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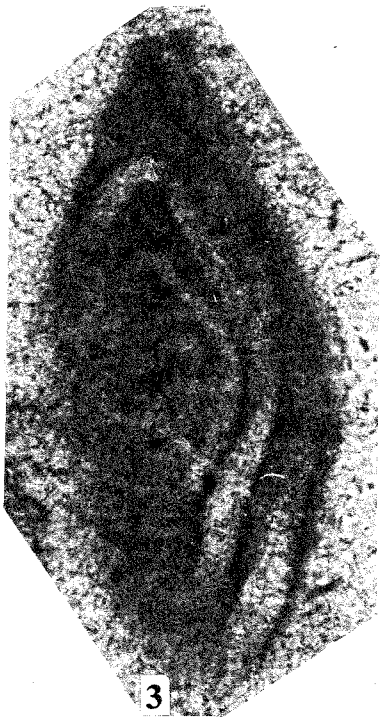

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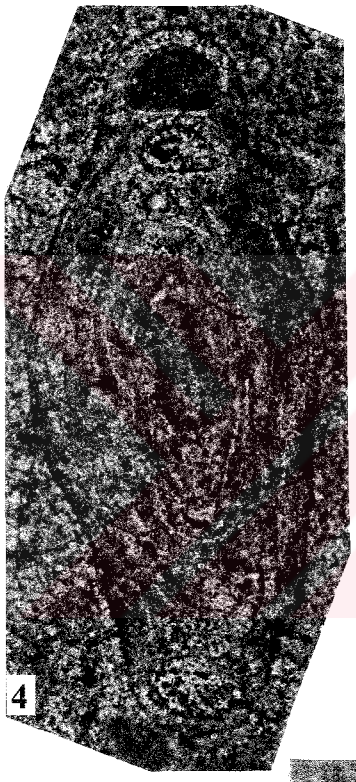

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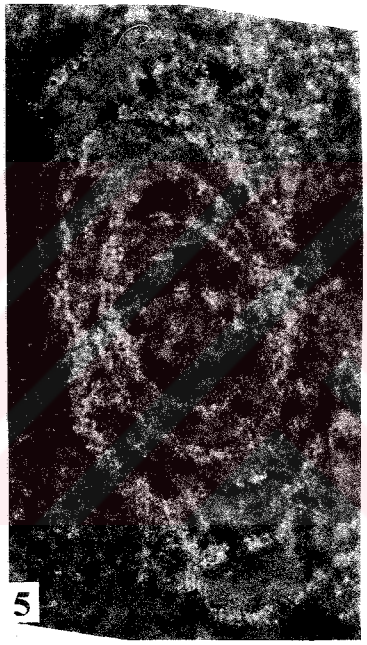

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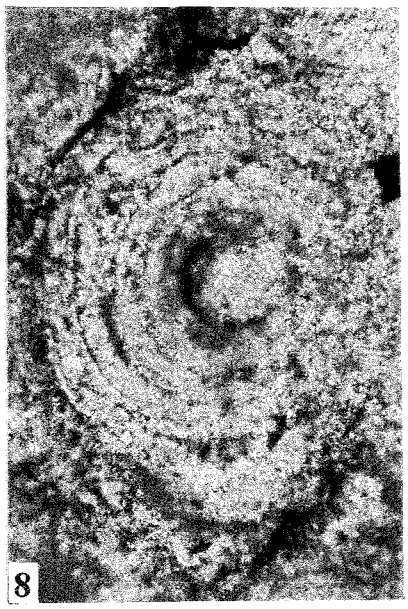

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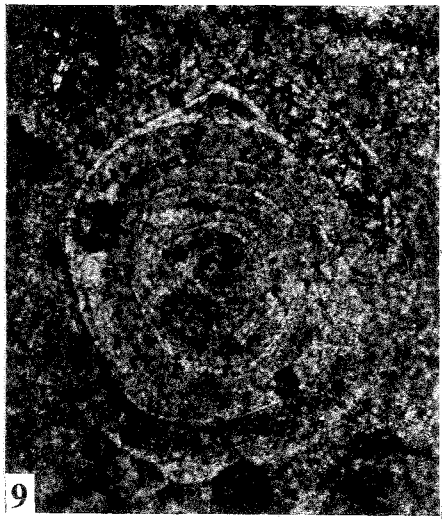

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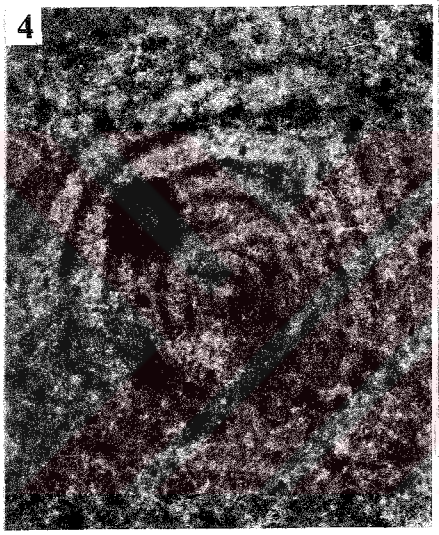

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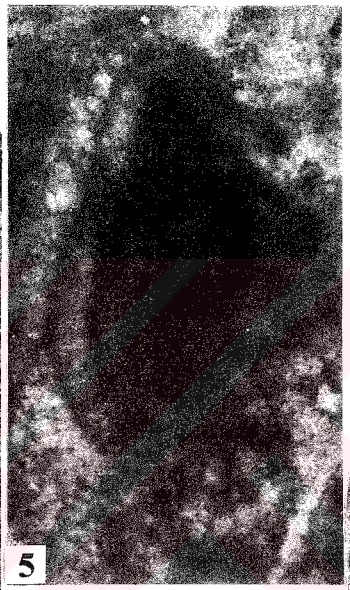

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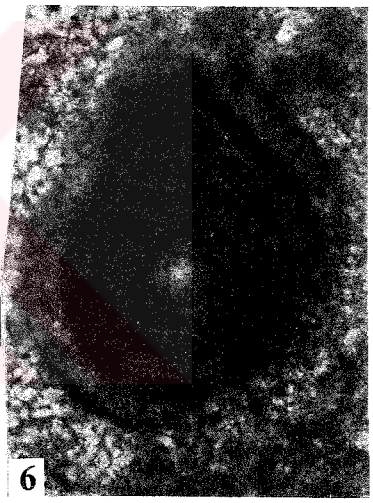

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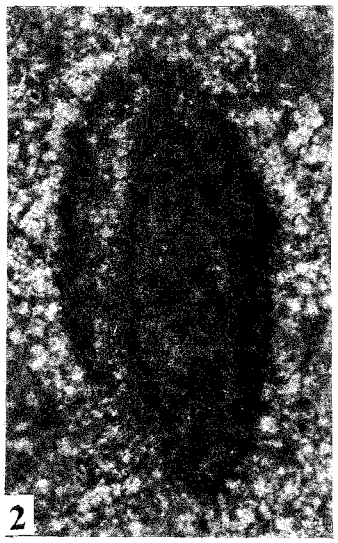

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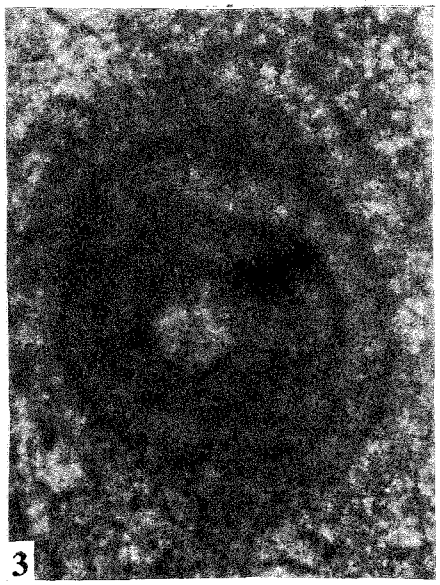

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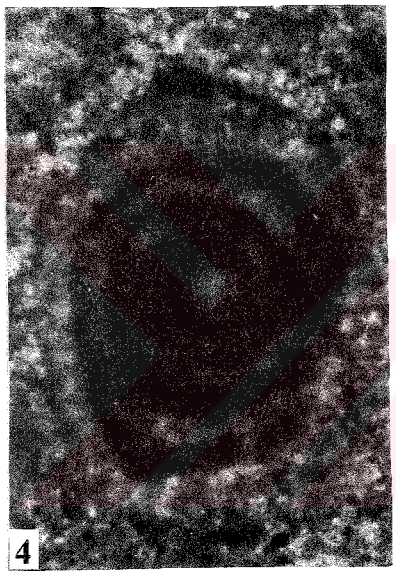

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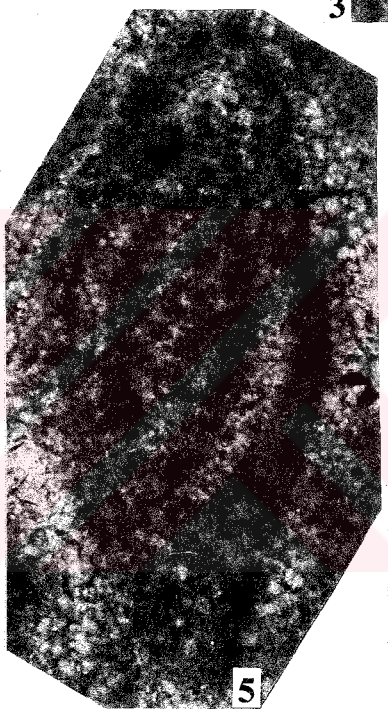

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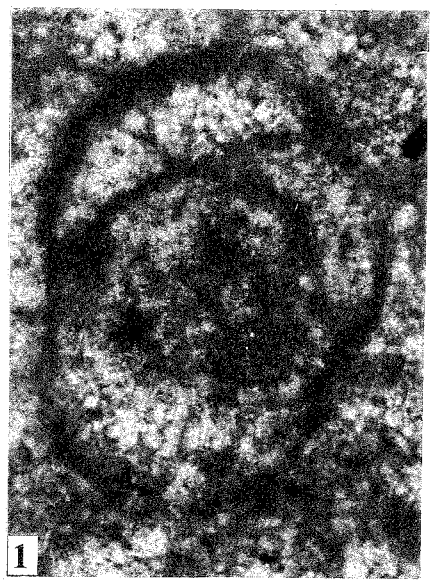

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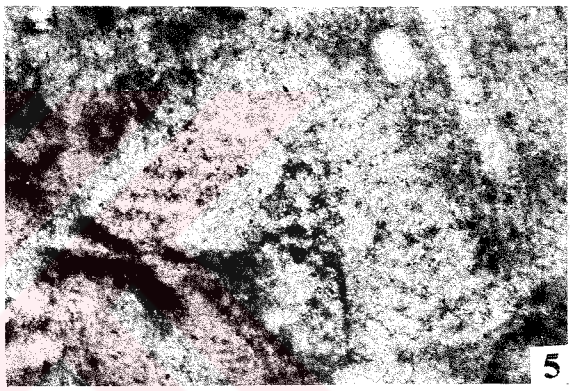

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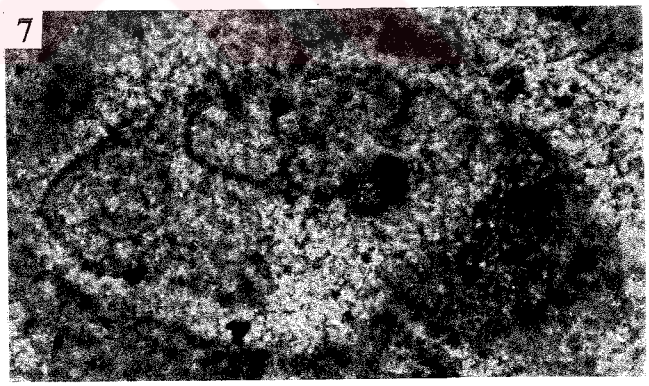

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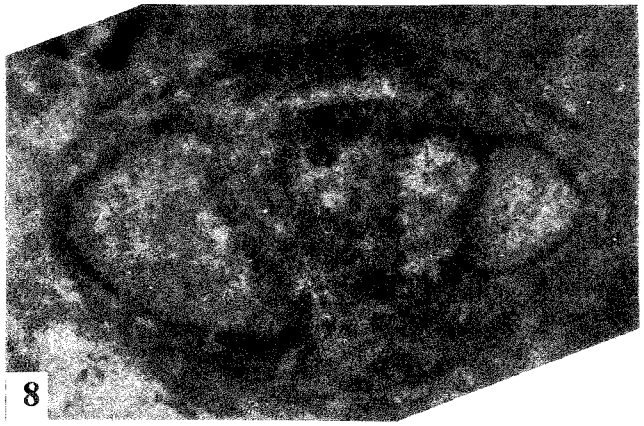

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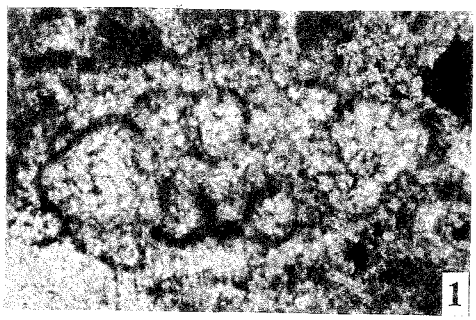

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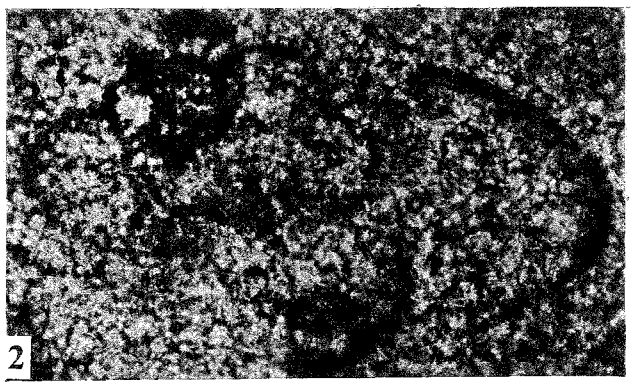

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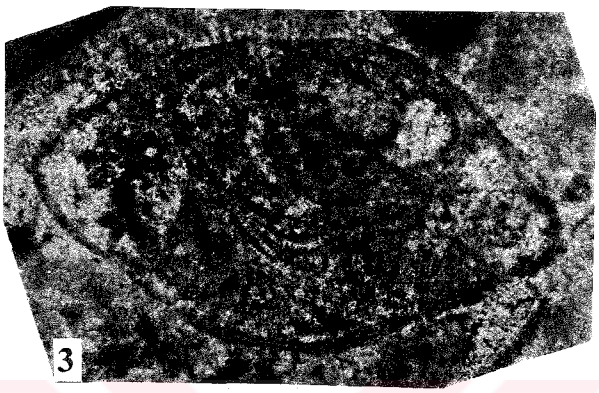

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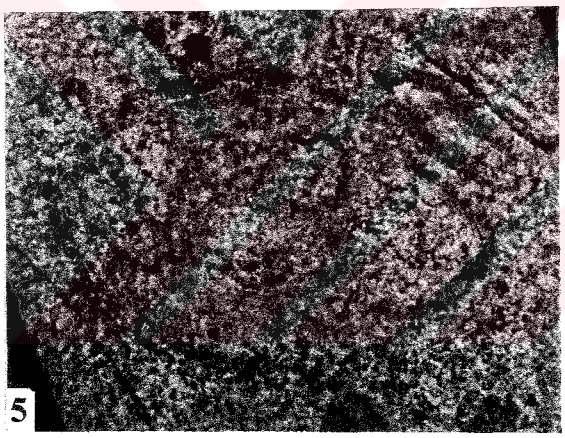

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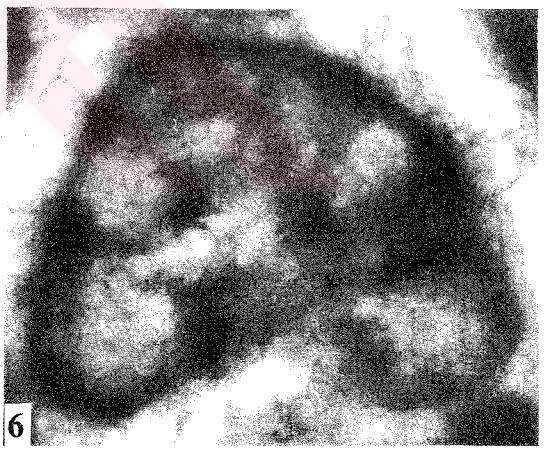

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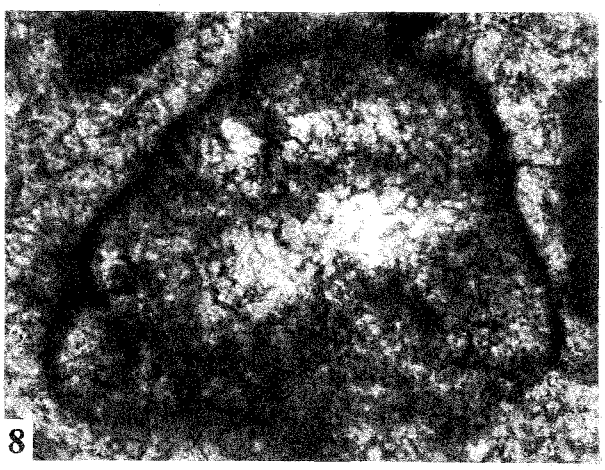

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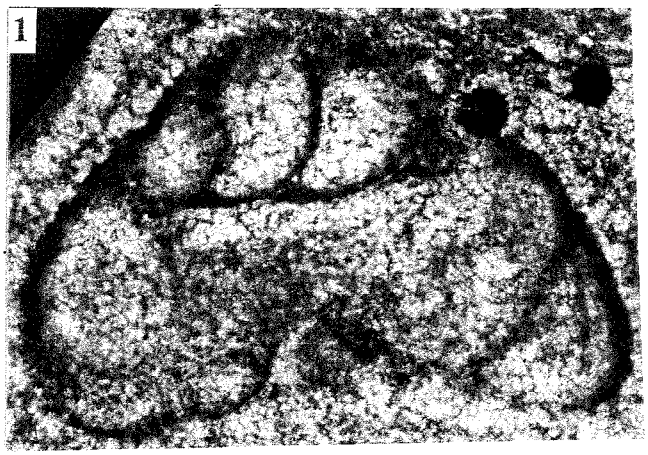

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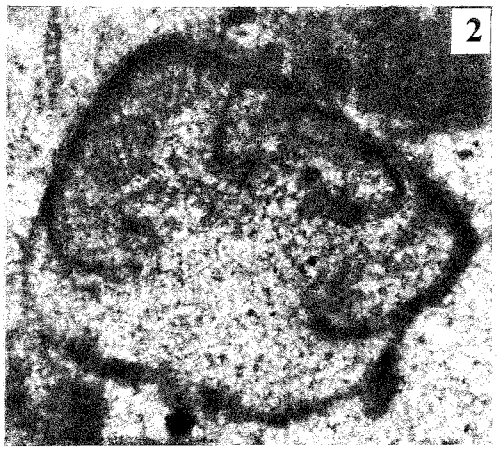

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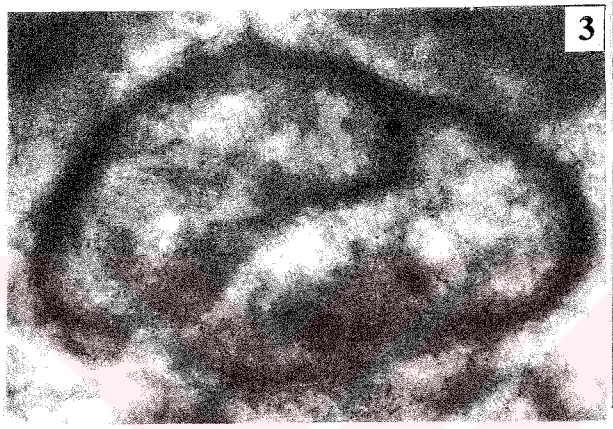

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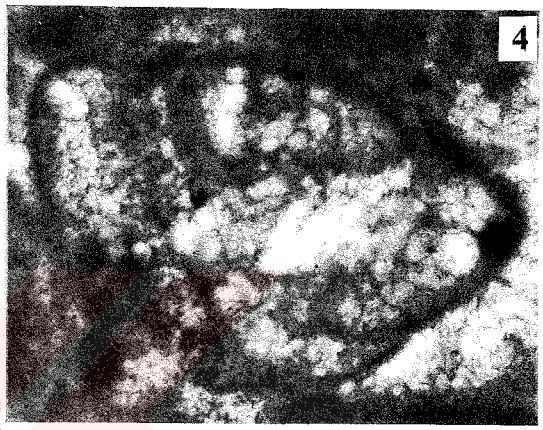

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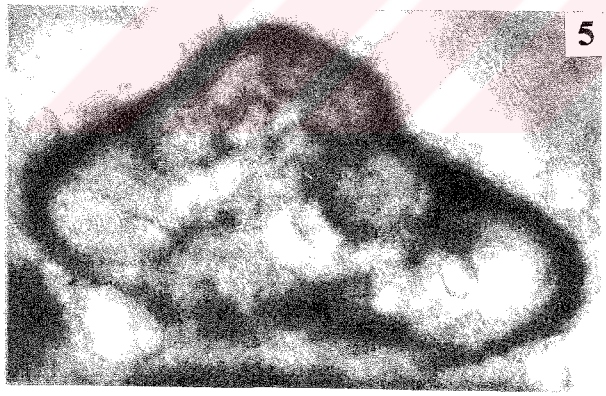

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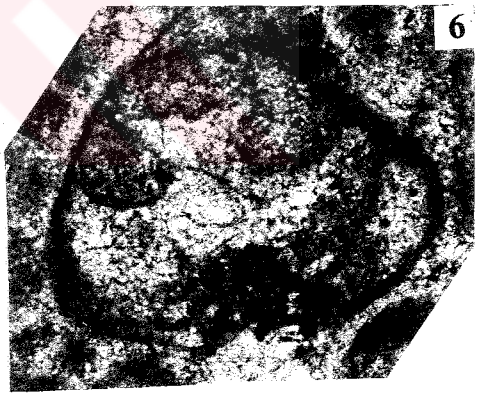

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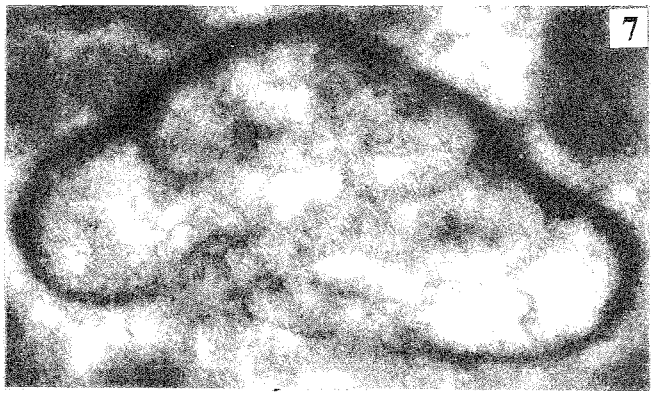

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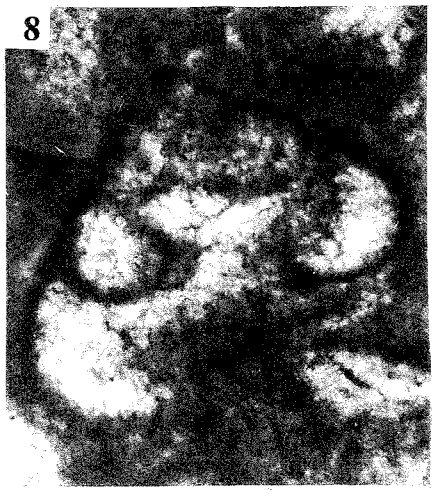

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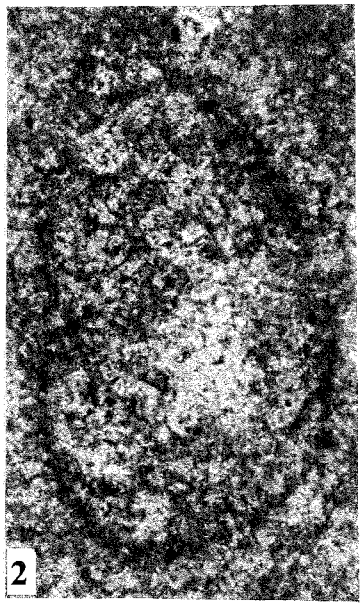

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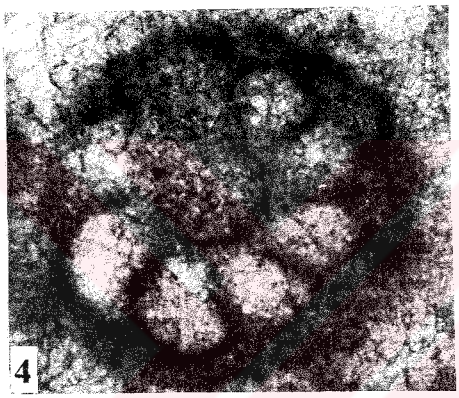

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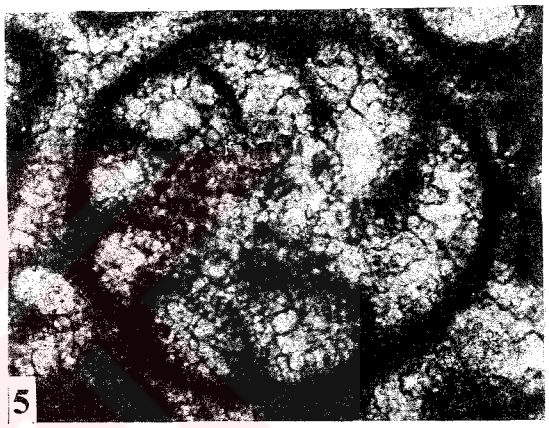

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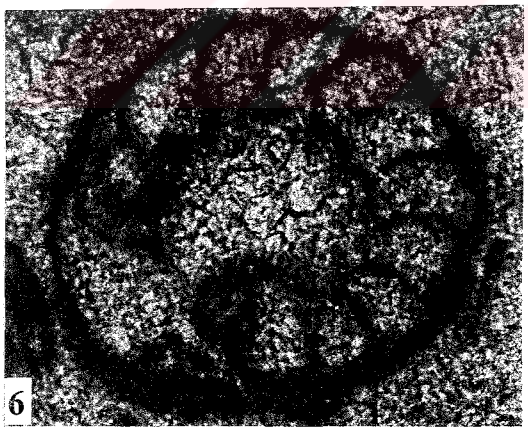

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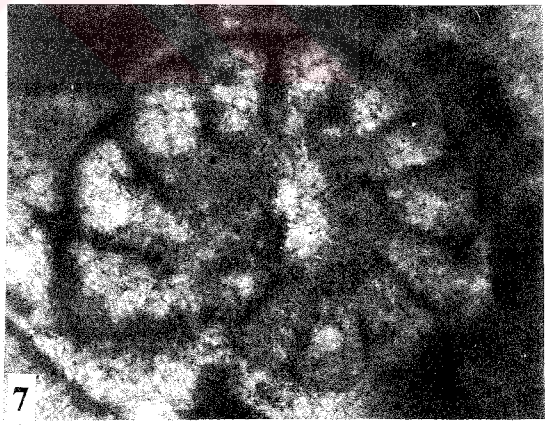

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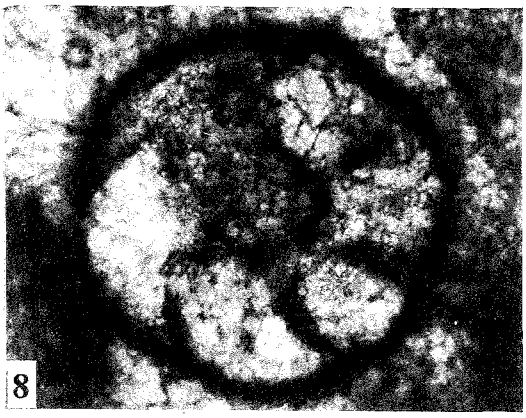

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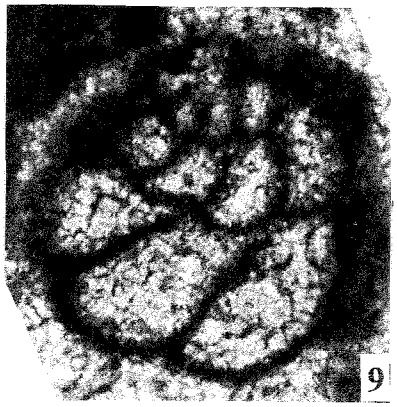

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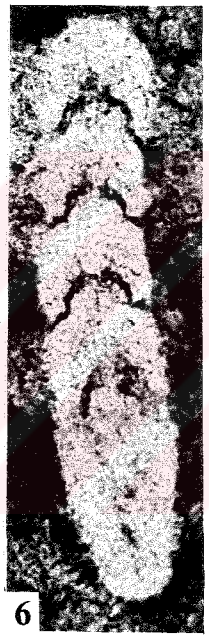

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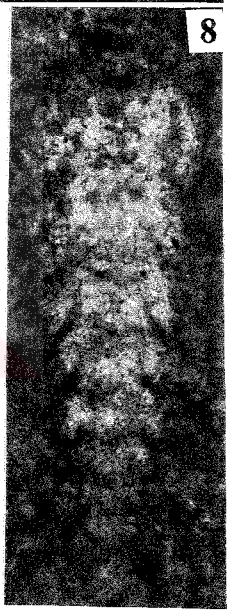

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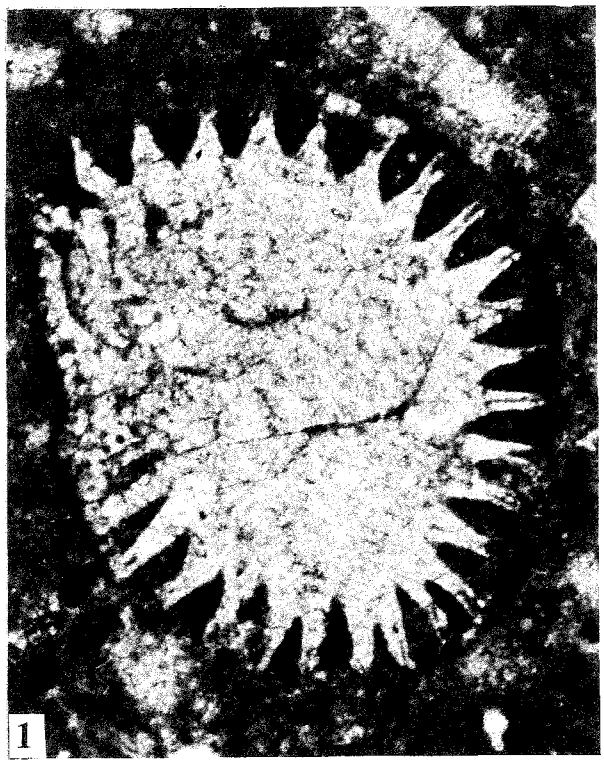

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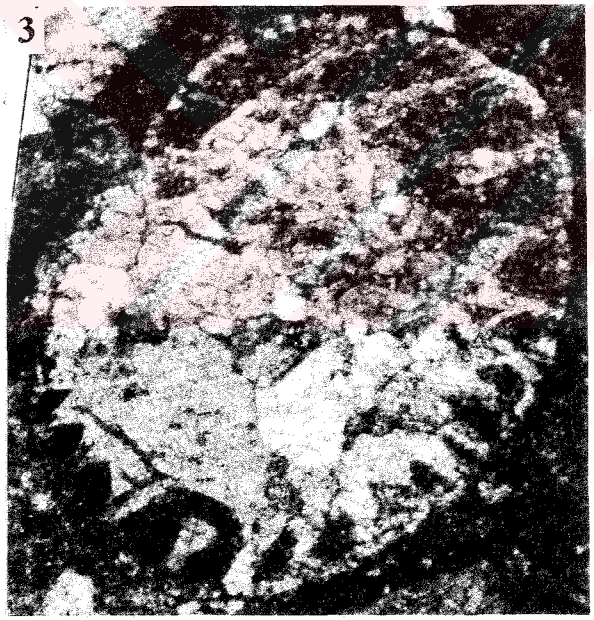

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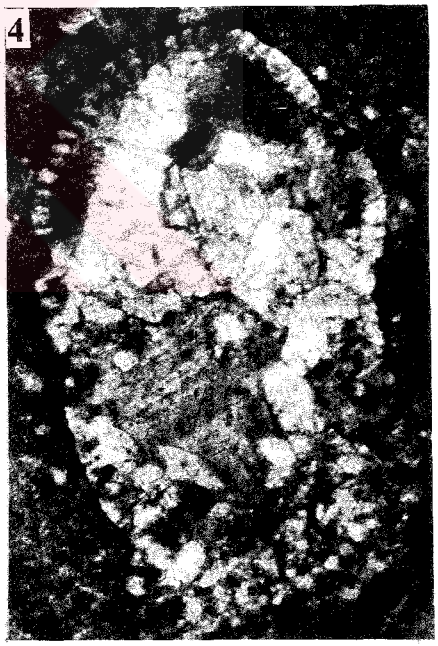

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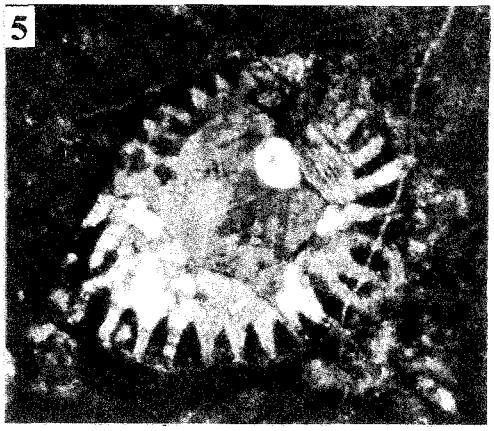

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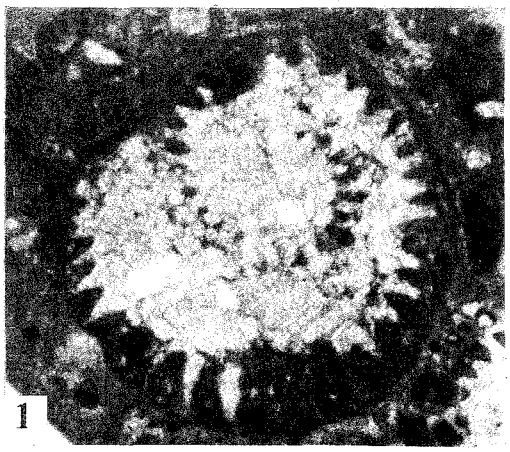

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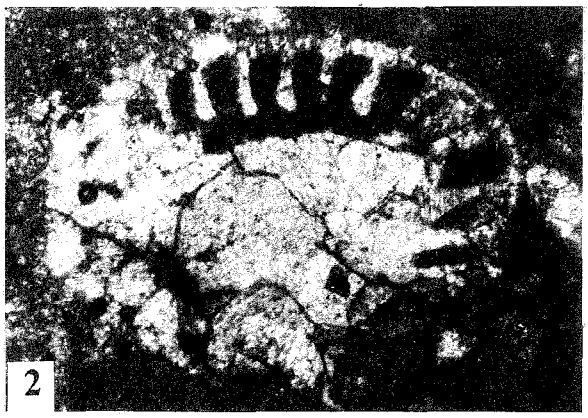

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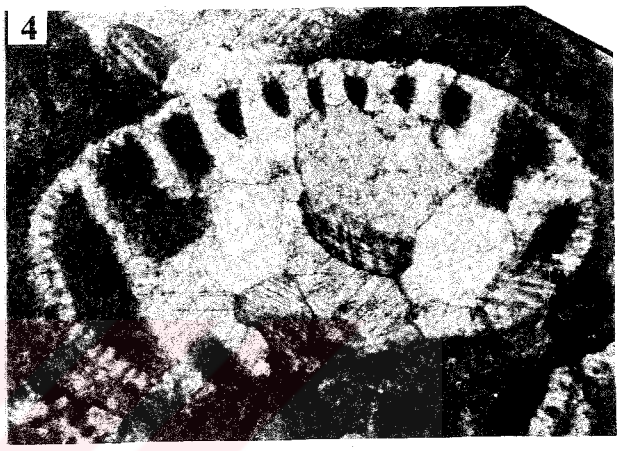

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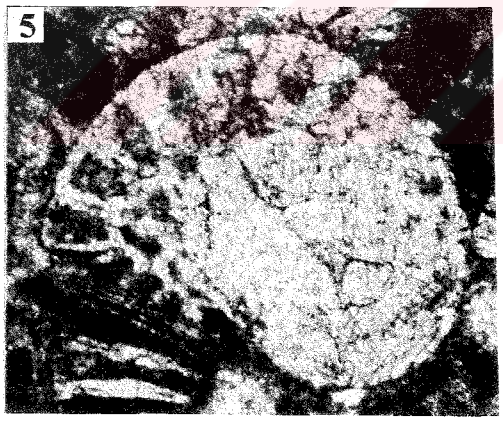

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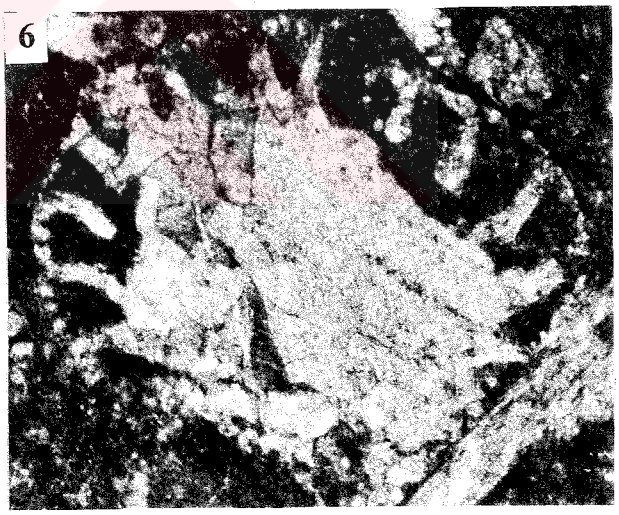

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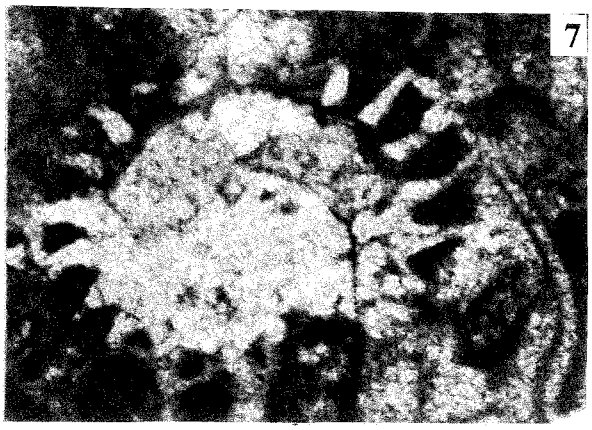

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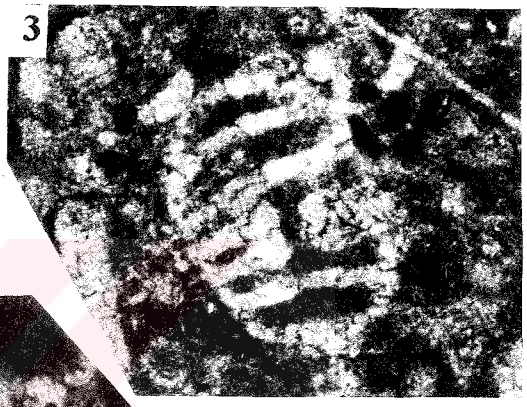

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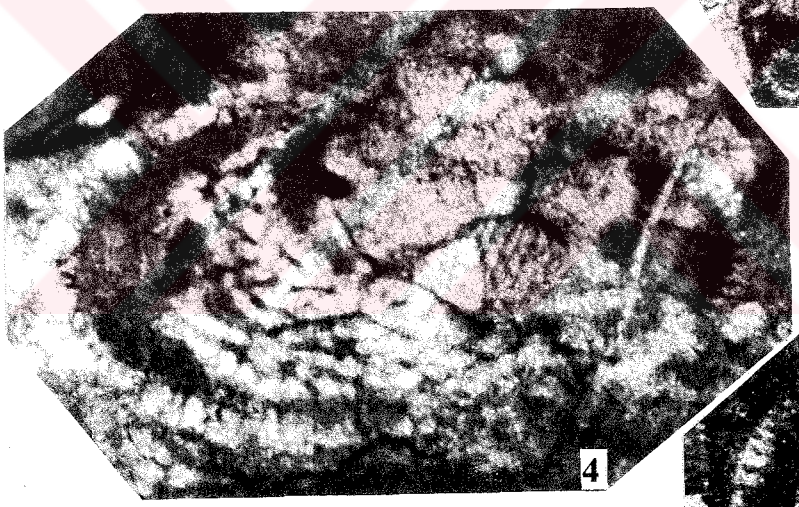

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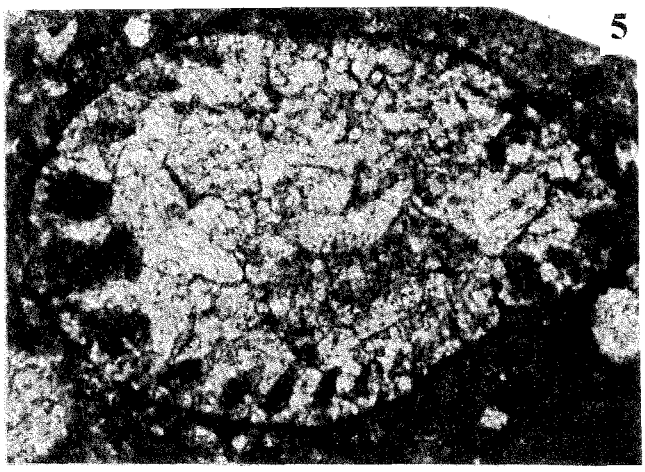

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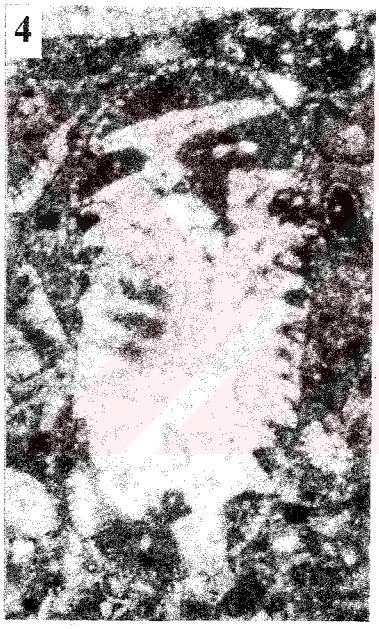

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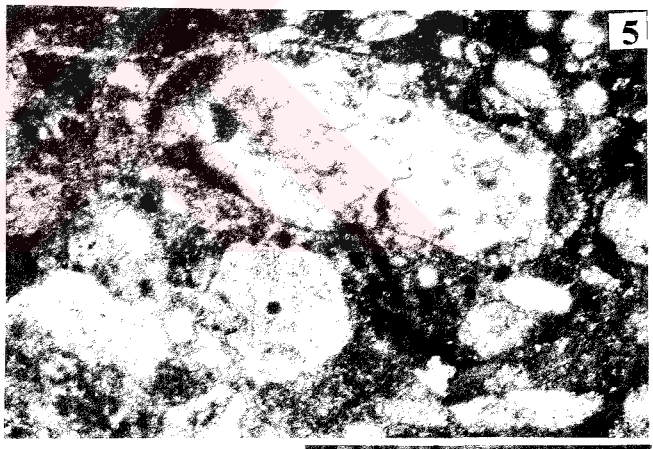

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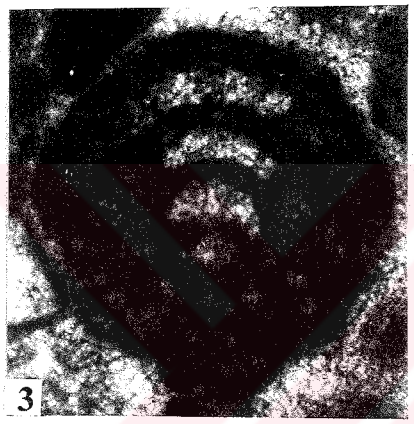

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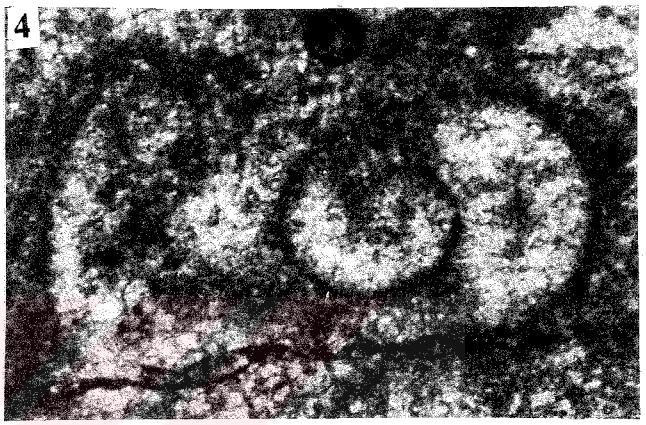

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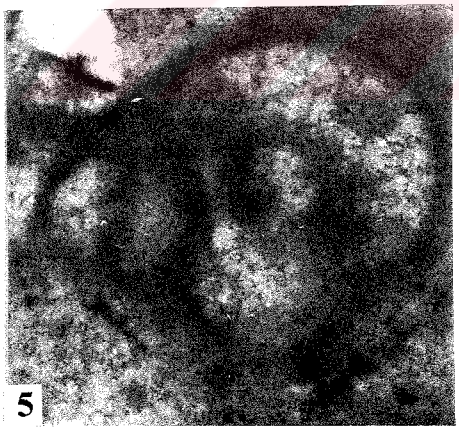

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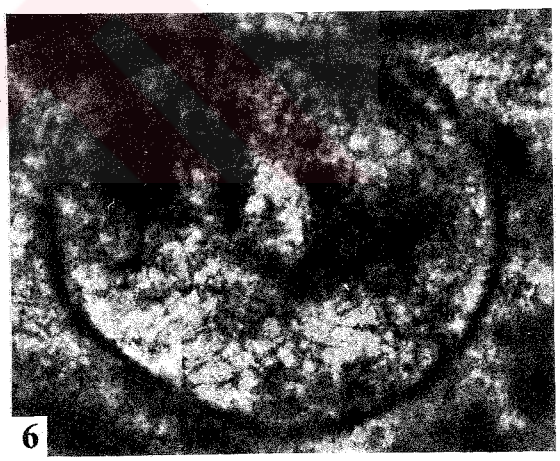

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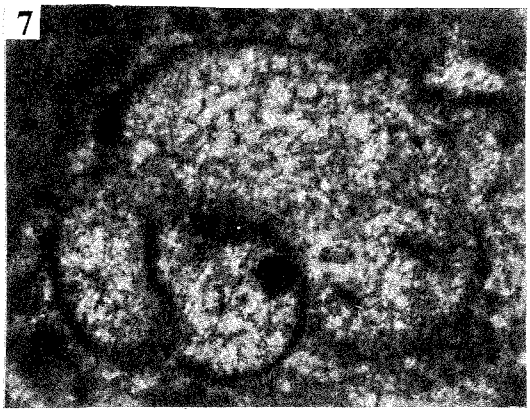

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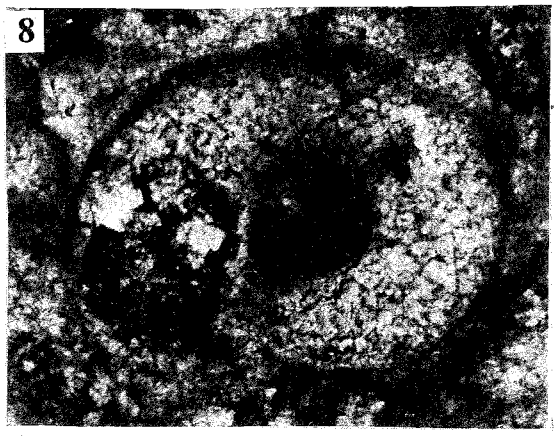

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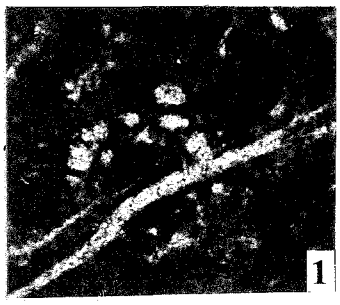

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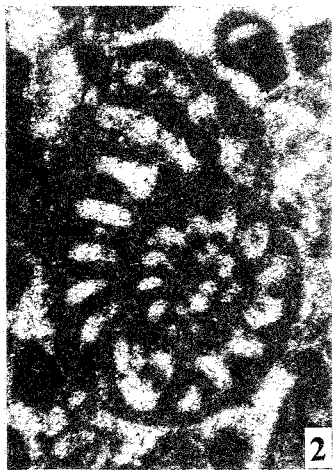

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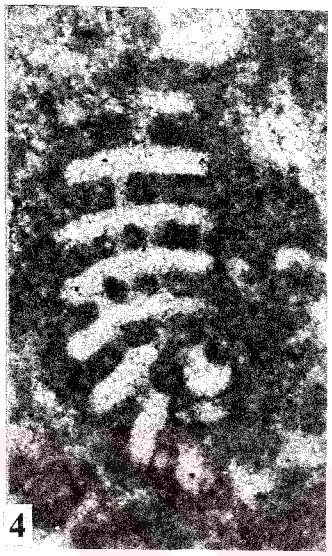

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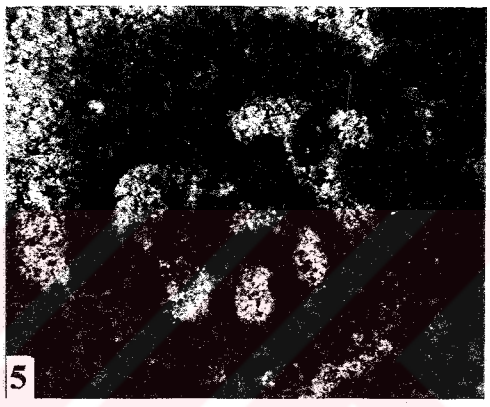

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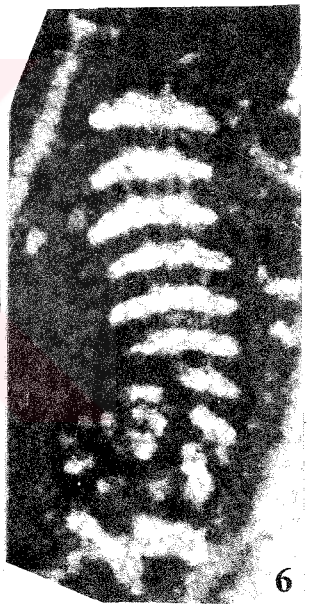

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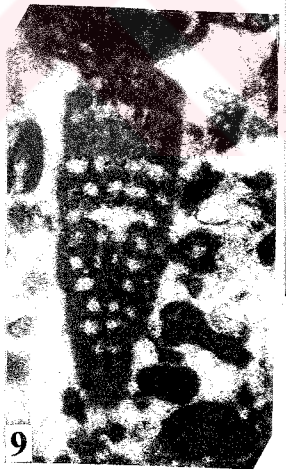

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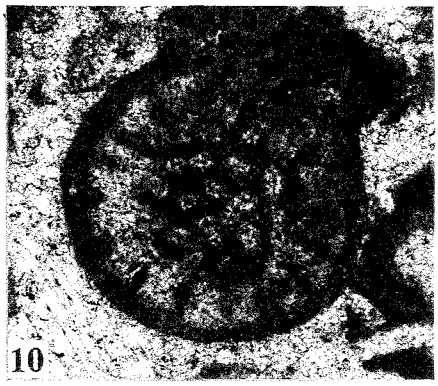

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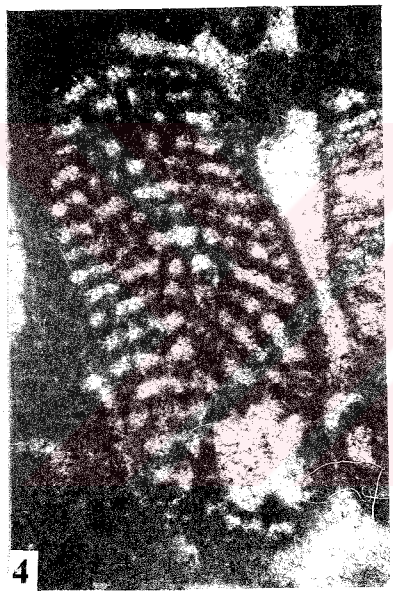

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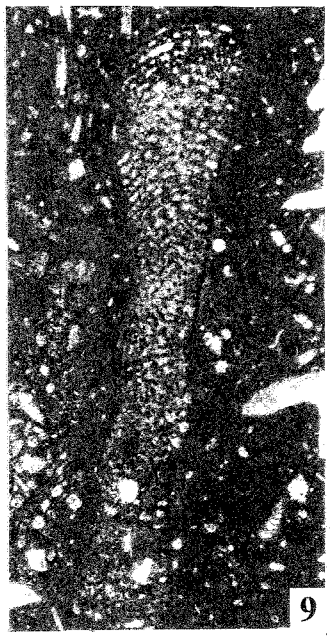

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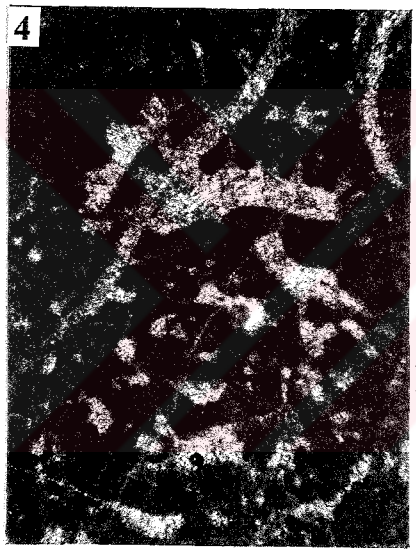

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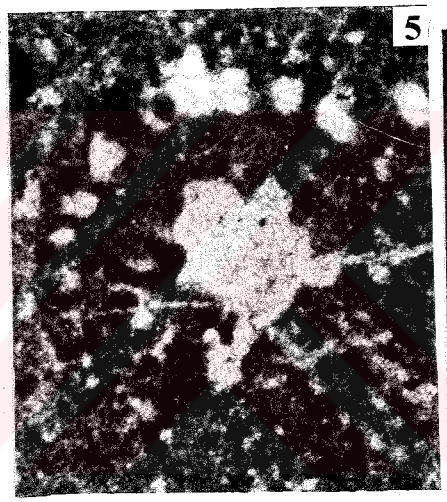

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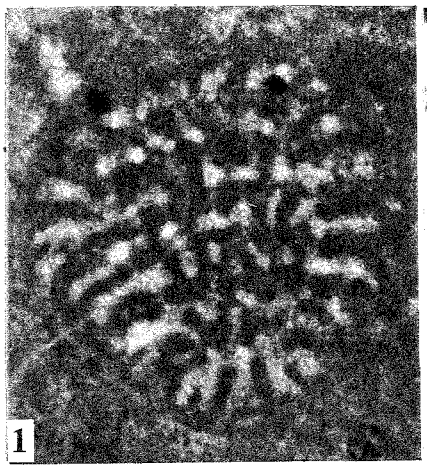

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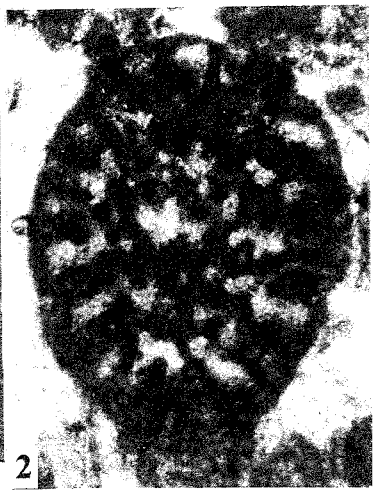

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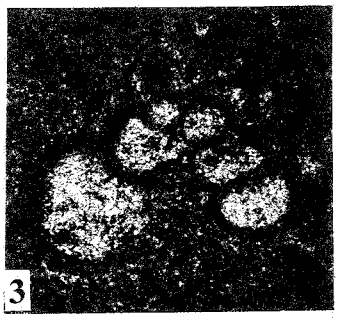

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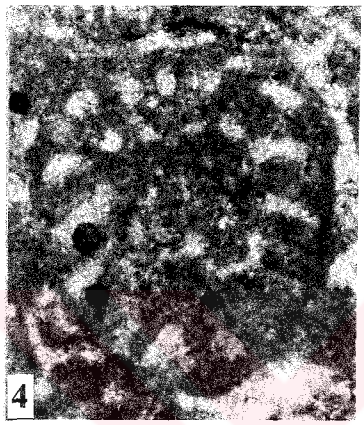

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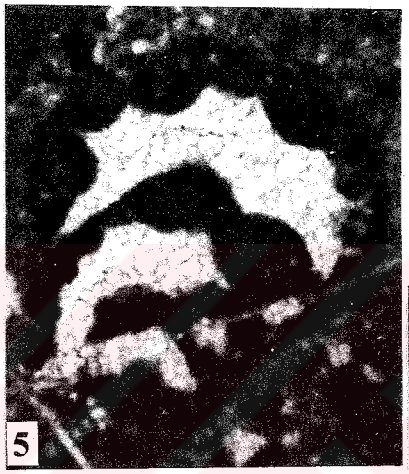

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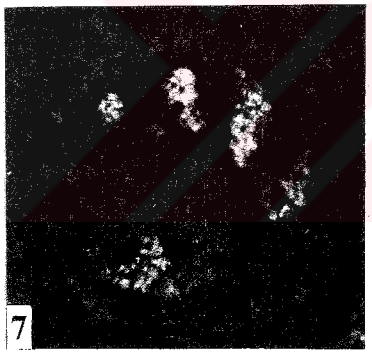

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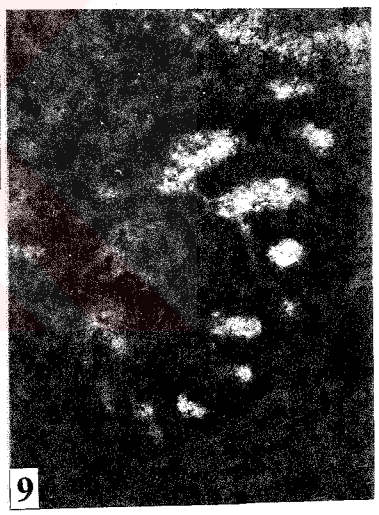

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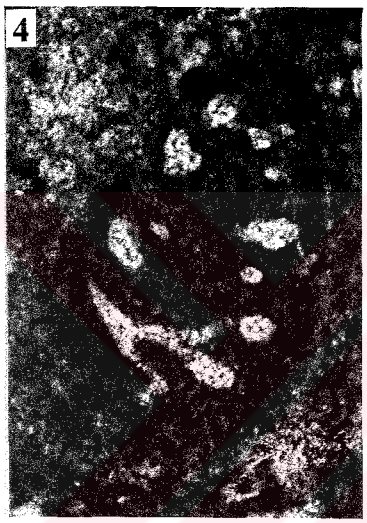

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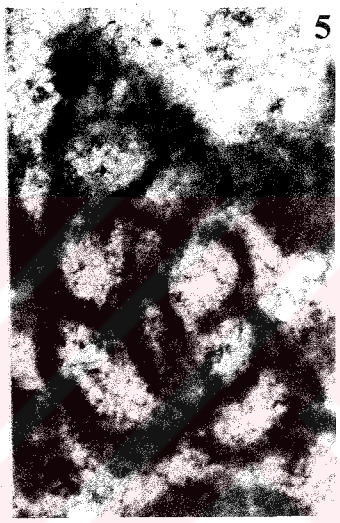

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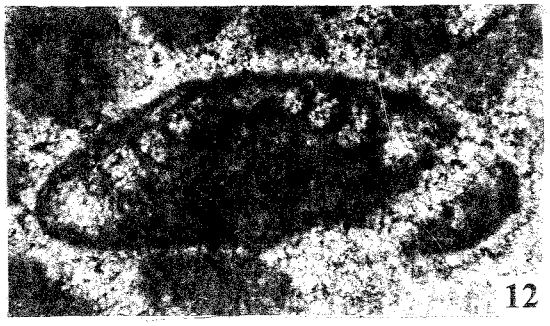

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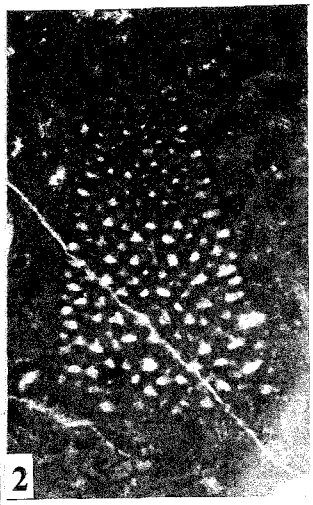

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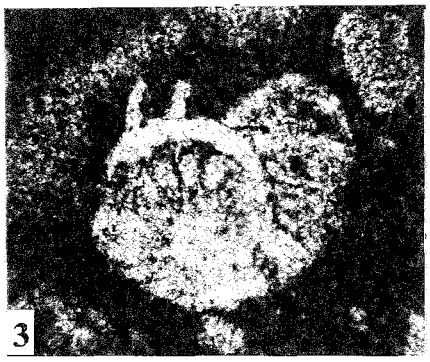

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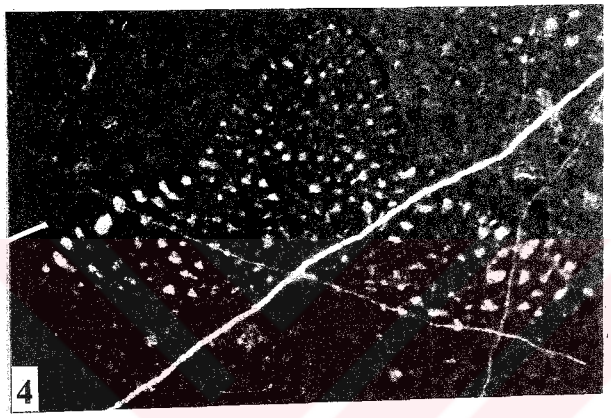

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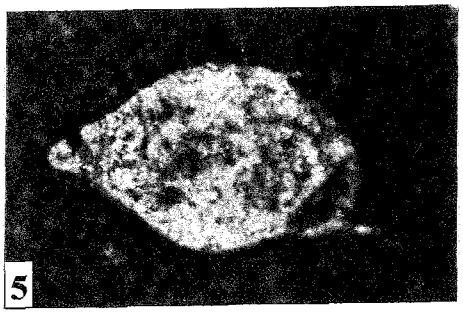

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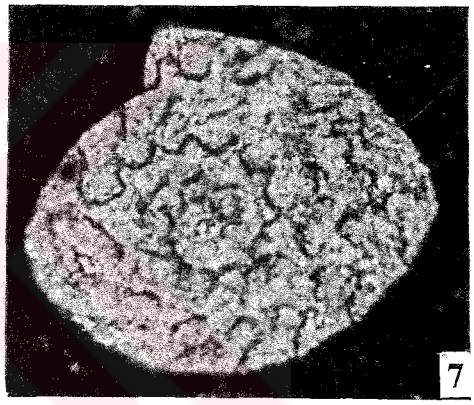

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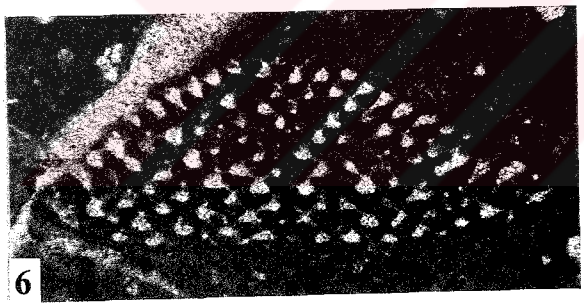

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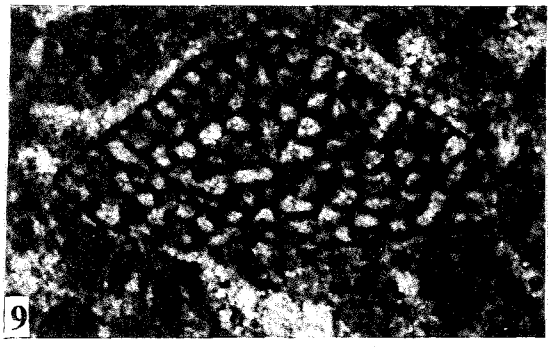

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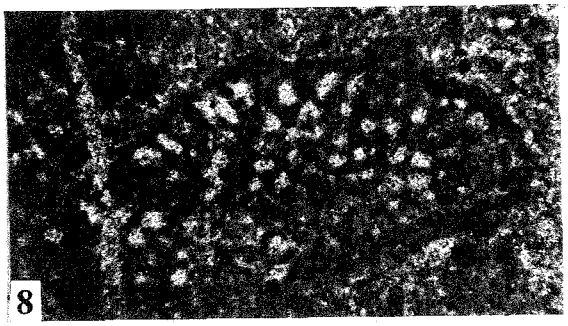

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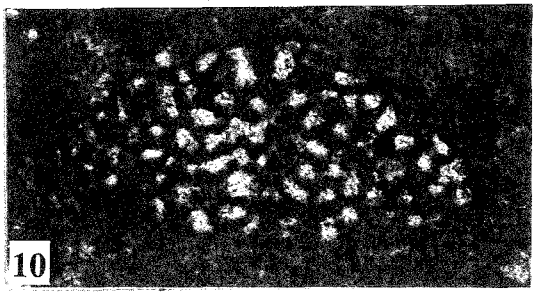

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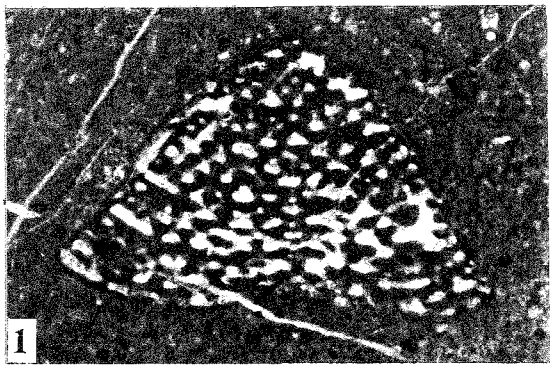

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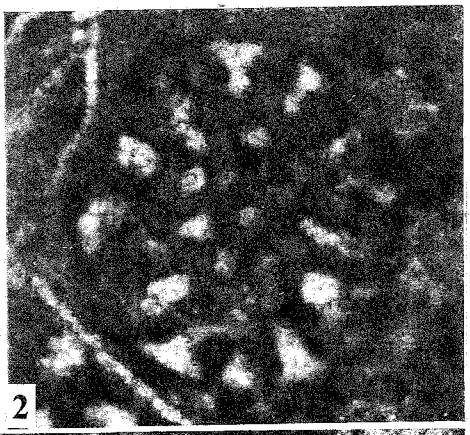

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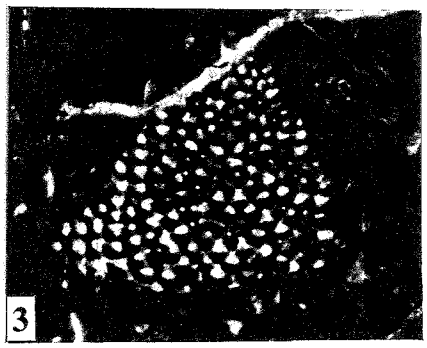

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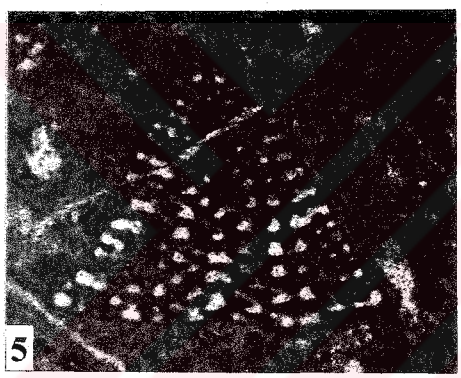

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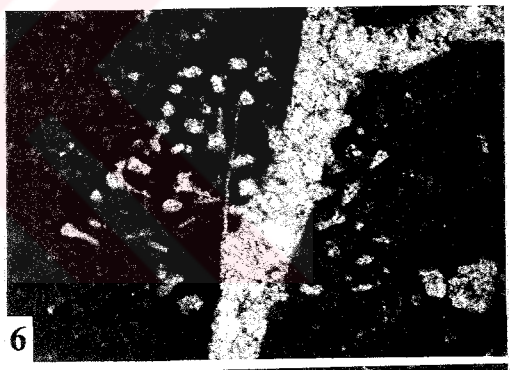

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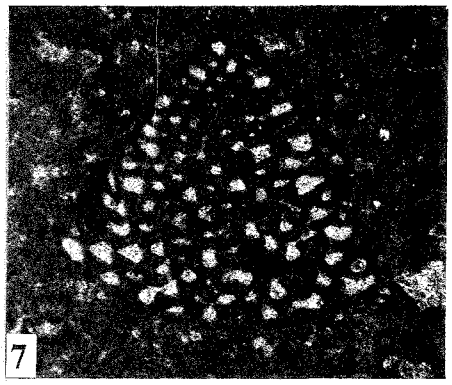

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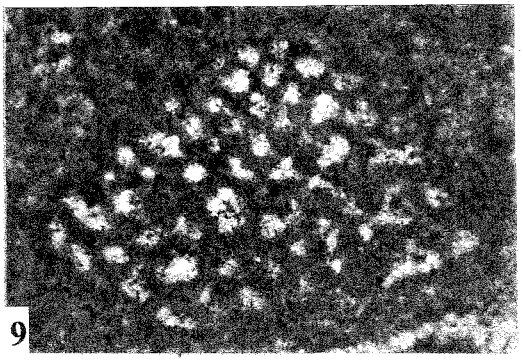

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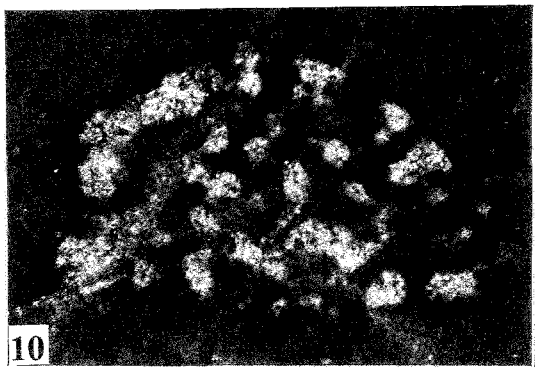

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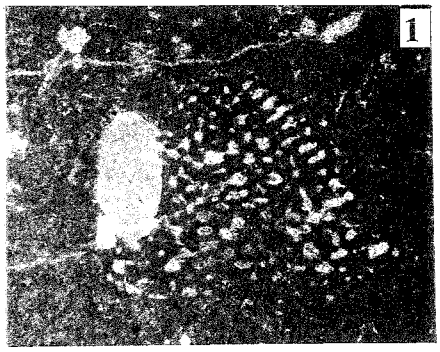

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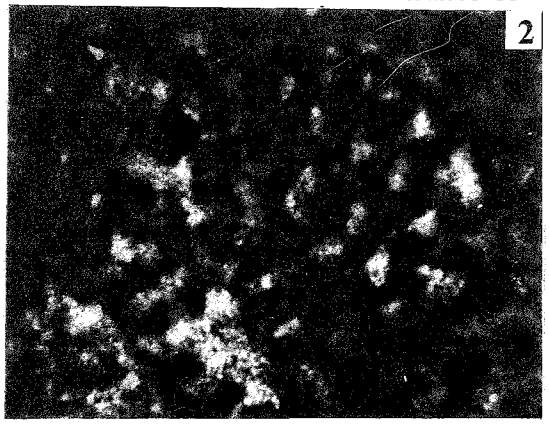

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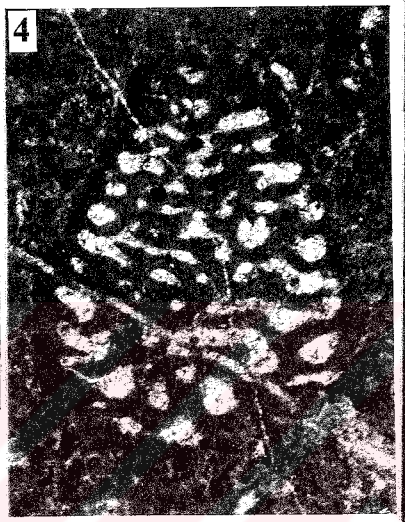

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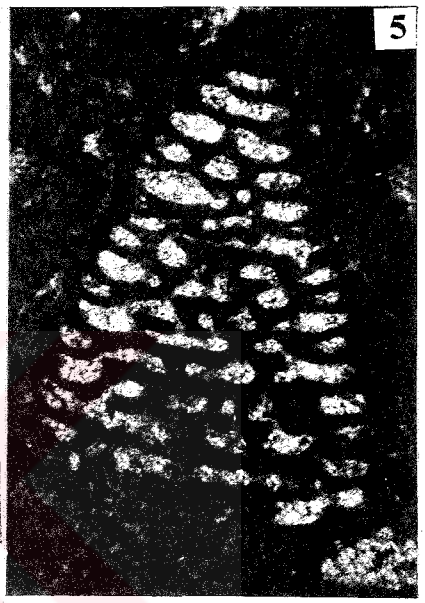

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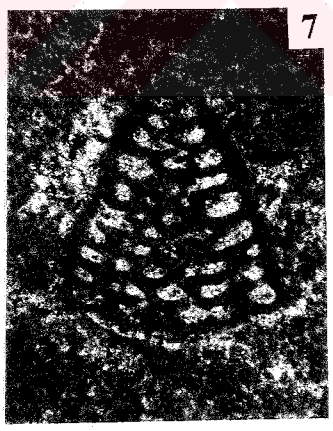

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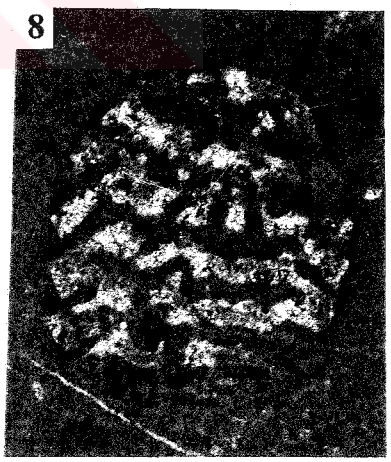

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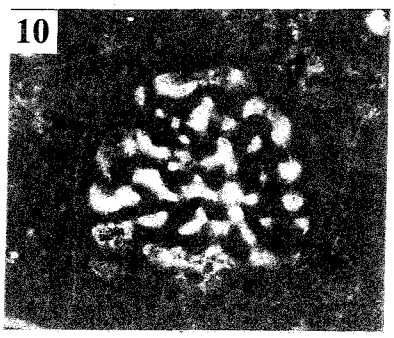

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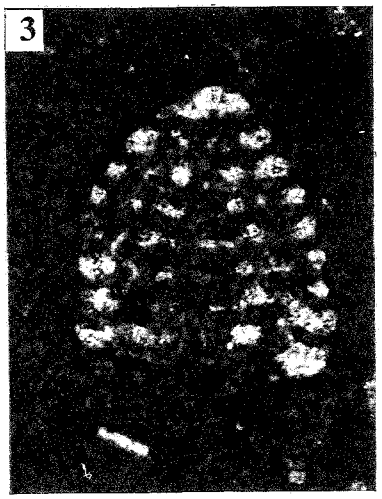

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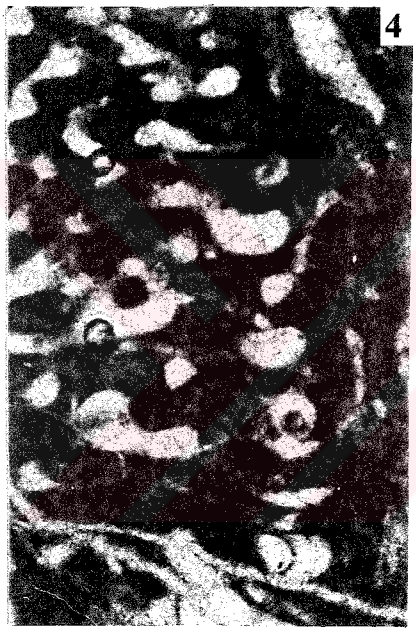

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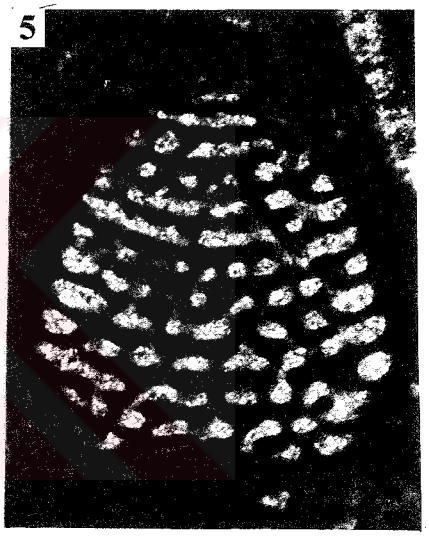

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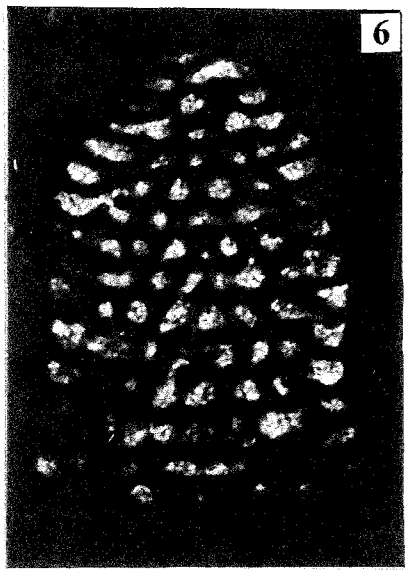

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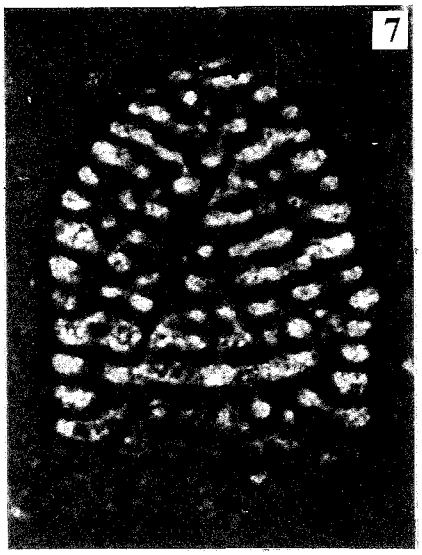

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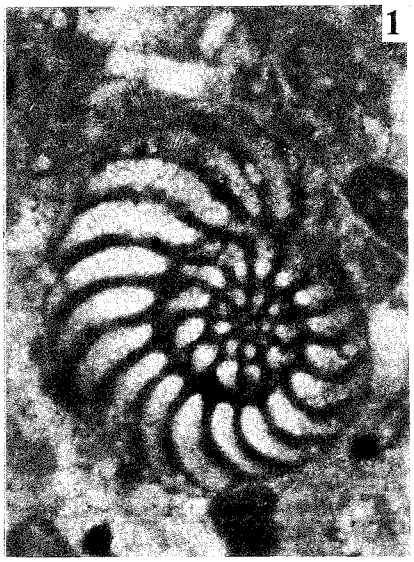

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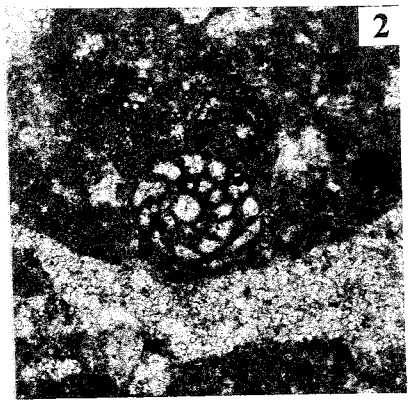

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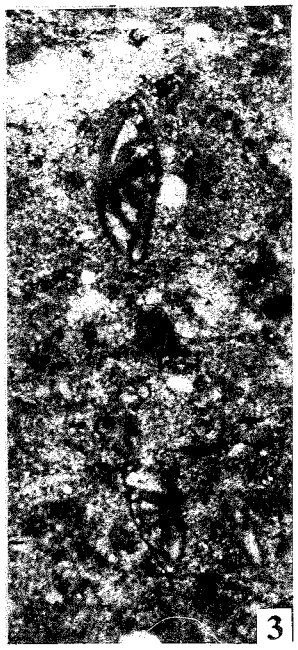

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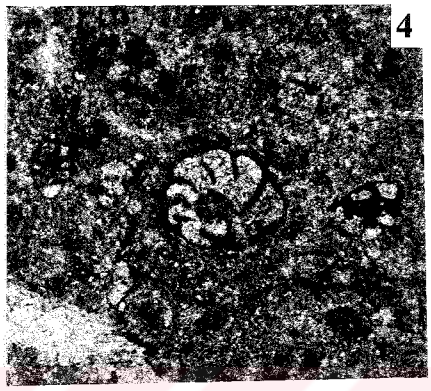

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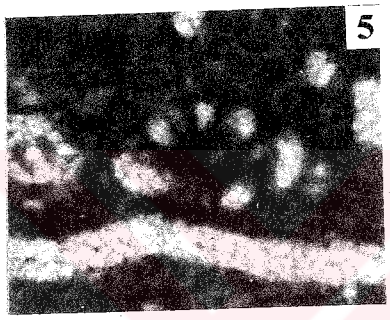

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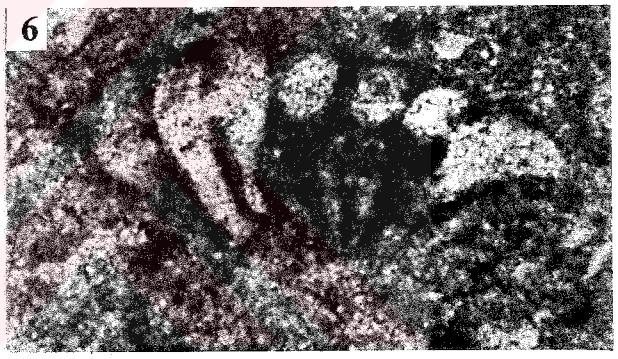

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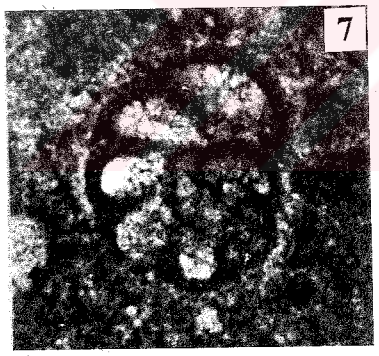

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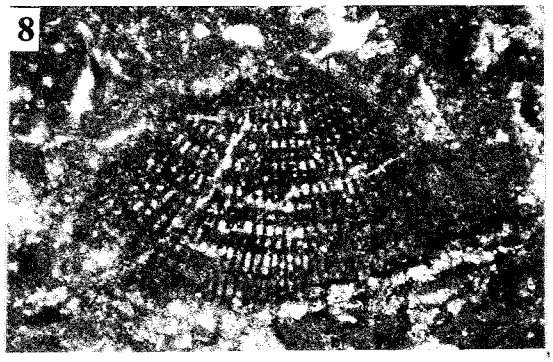

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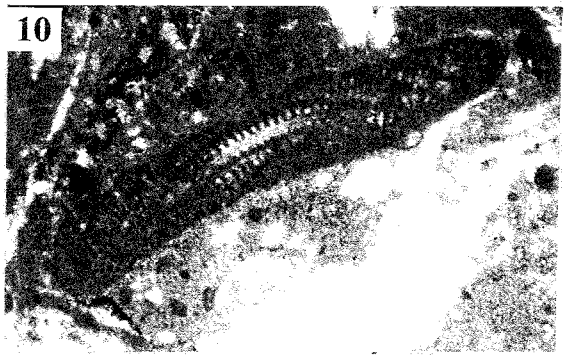

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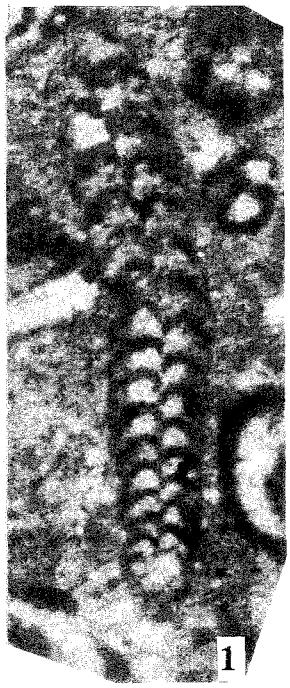

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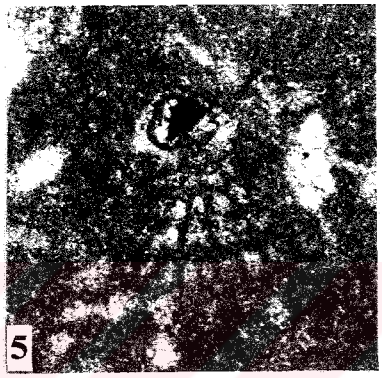

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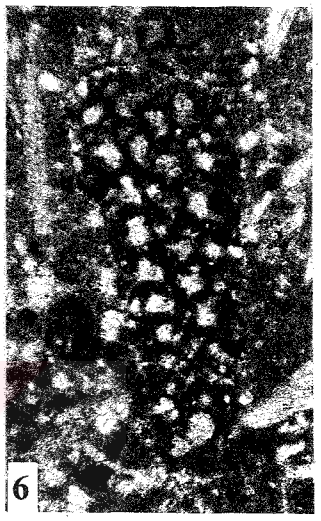

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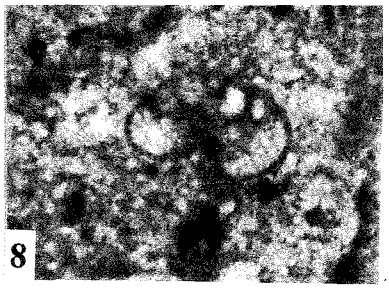

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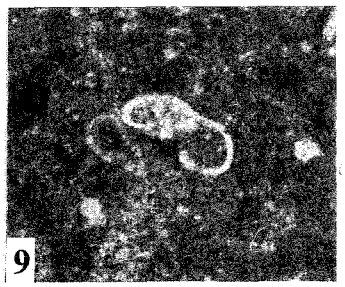

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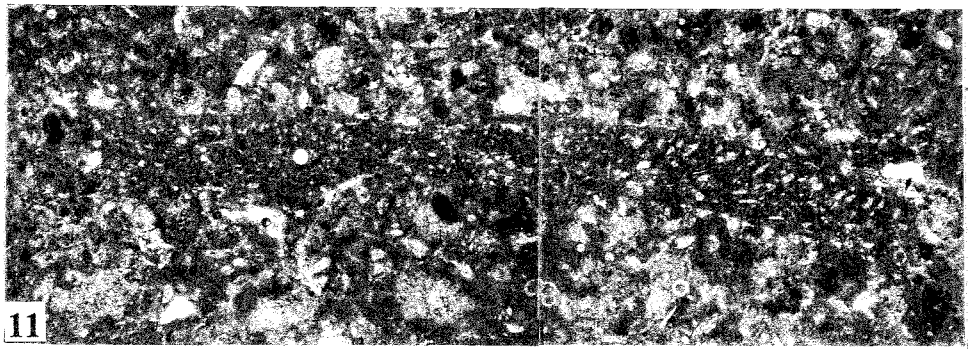

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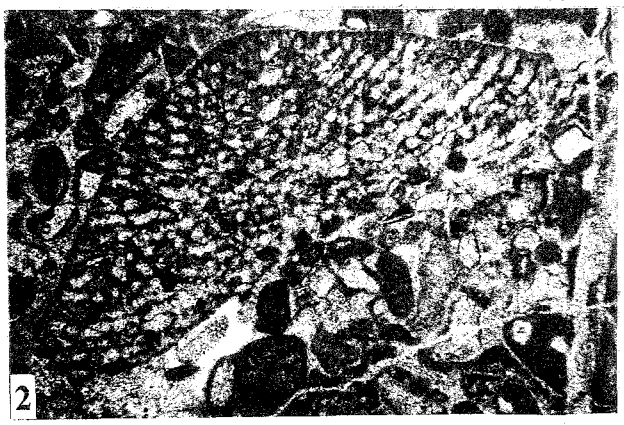

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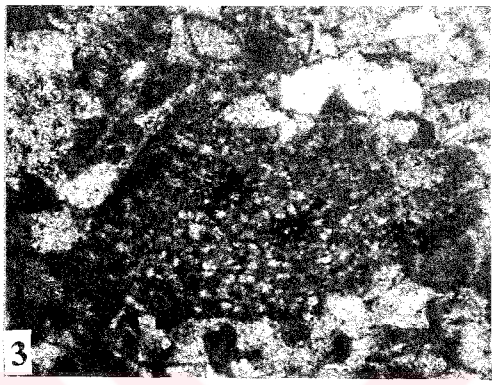

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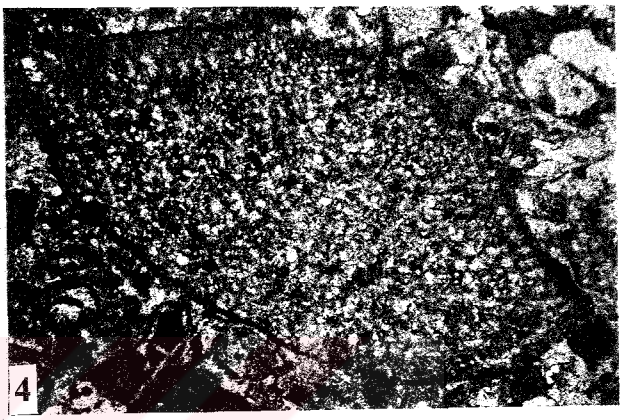

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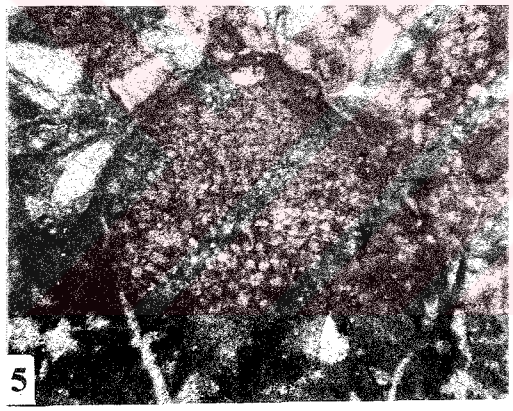

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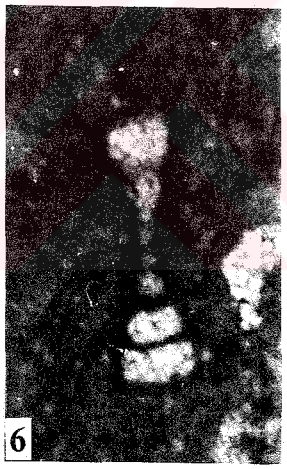

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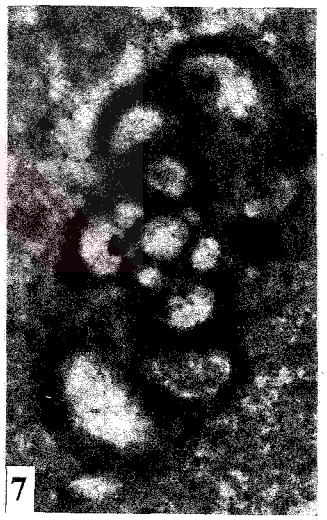

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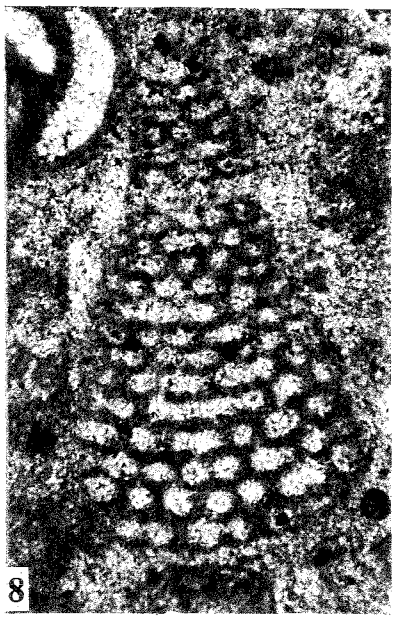

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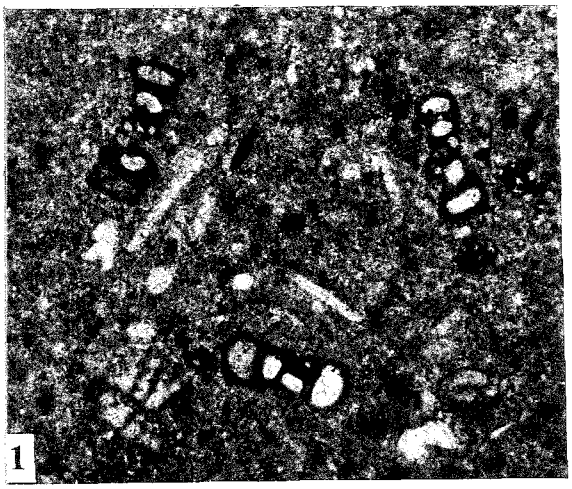

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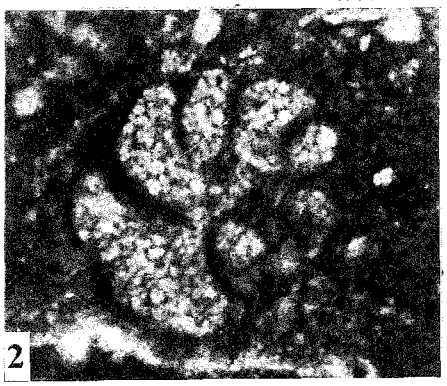

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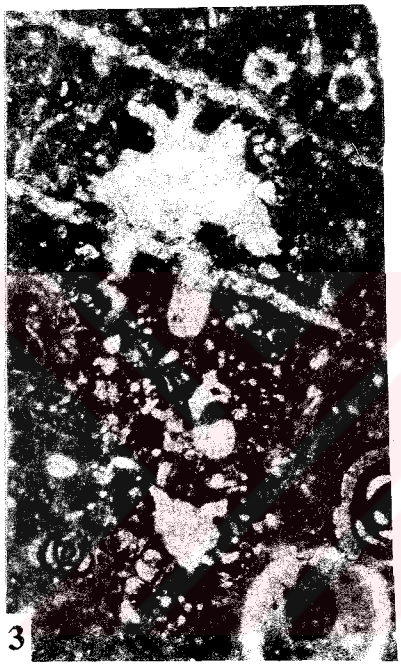

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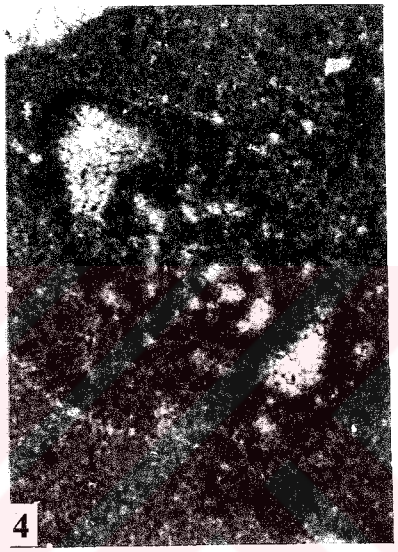

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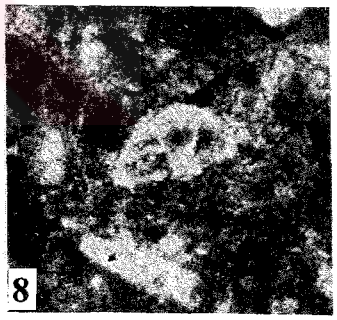

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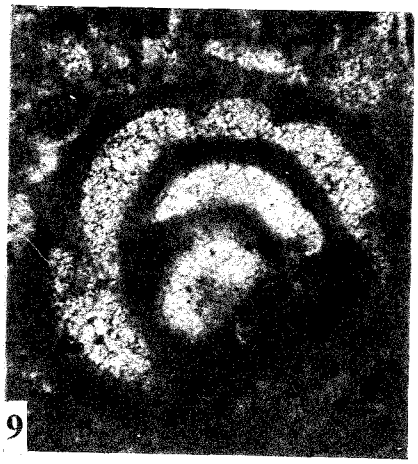

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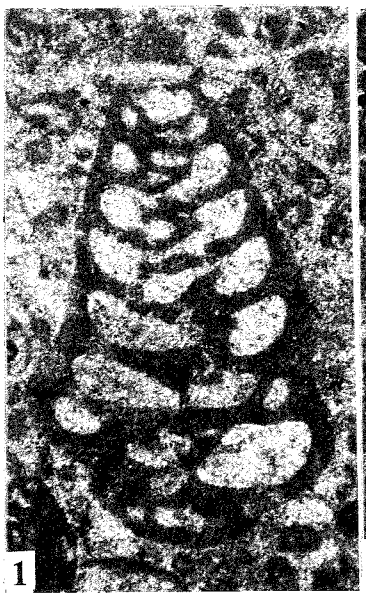

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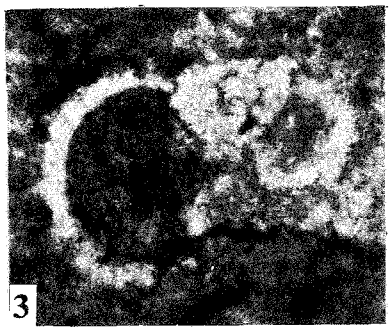

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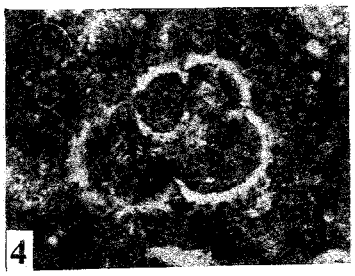

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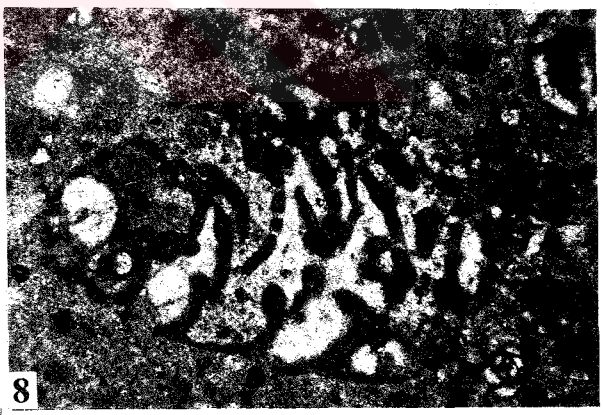

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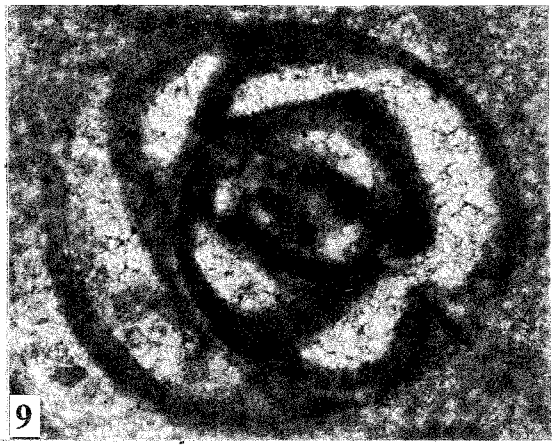

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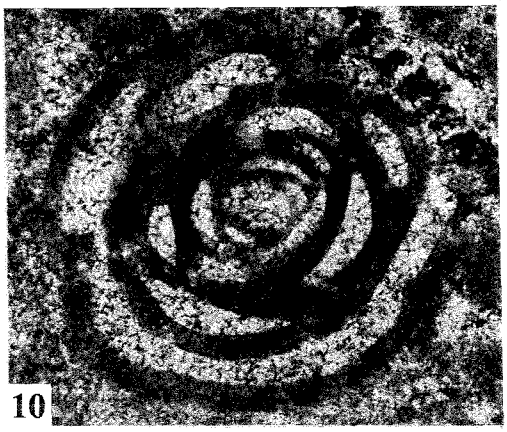

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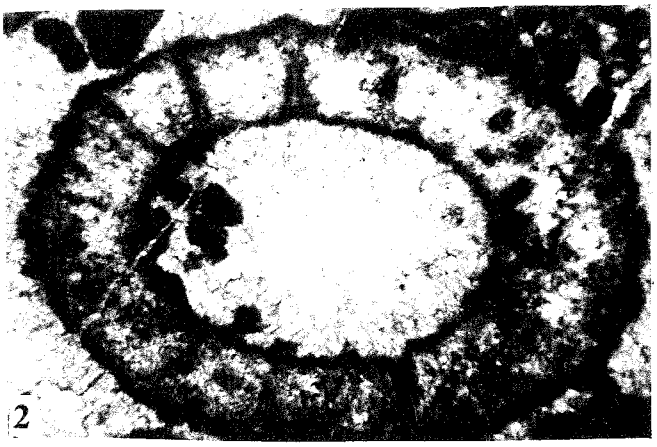

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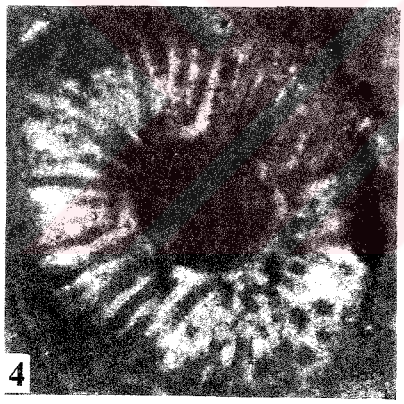

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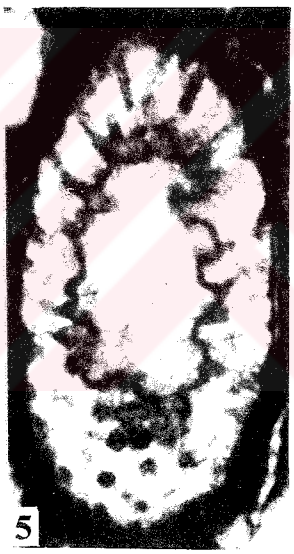
T.C. YÜKSEKÖĞRETİM KURULU
DOKÜMANTASYON MERKEZİ


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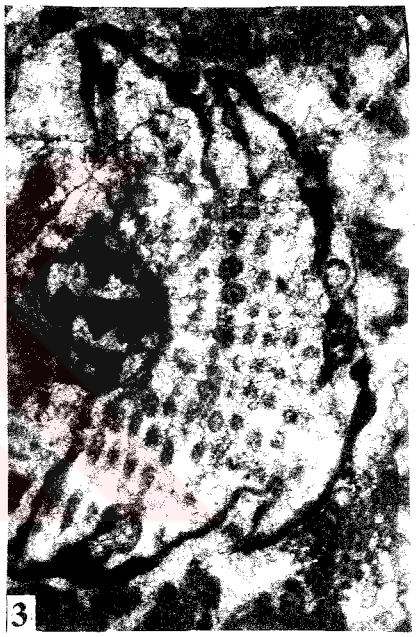

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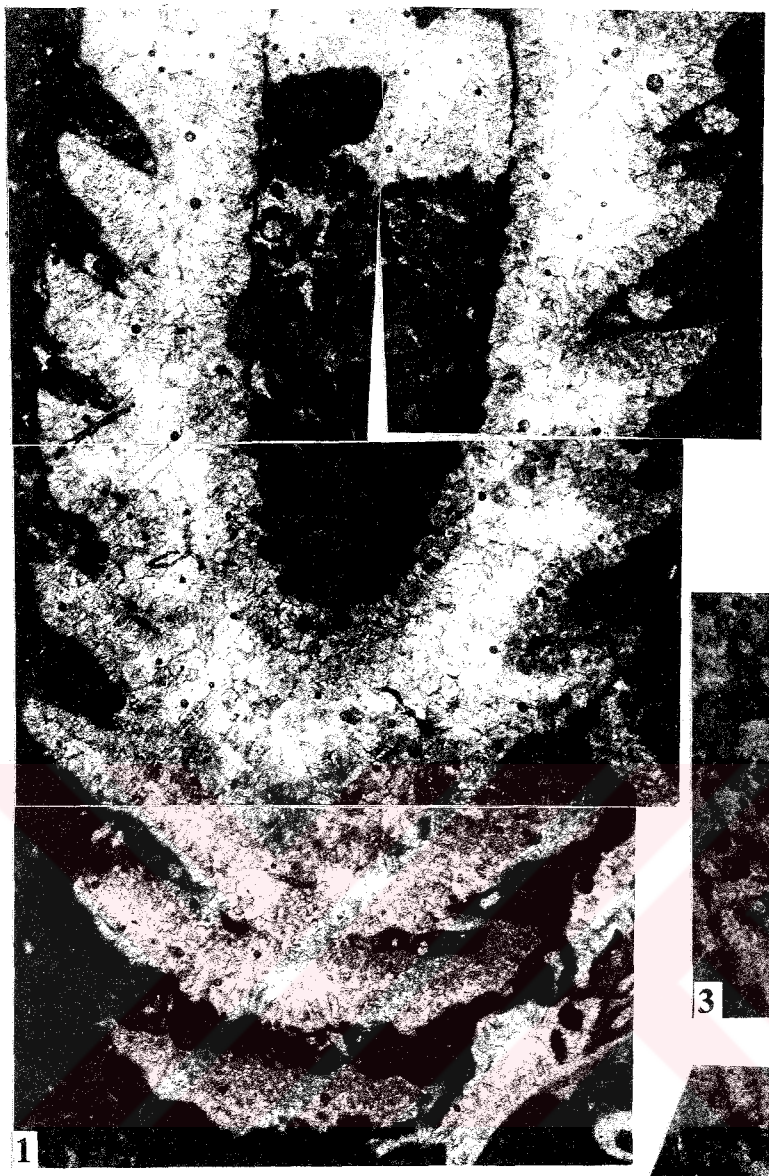

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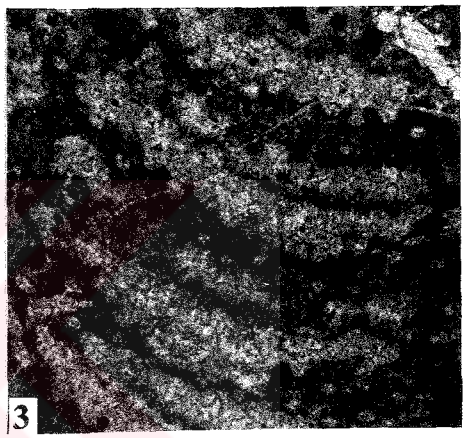

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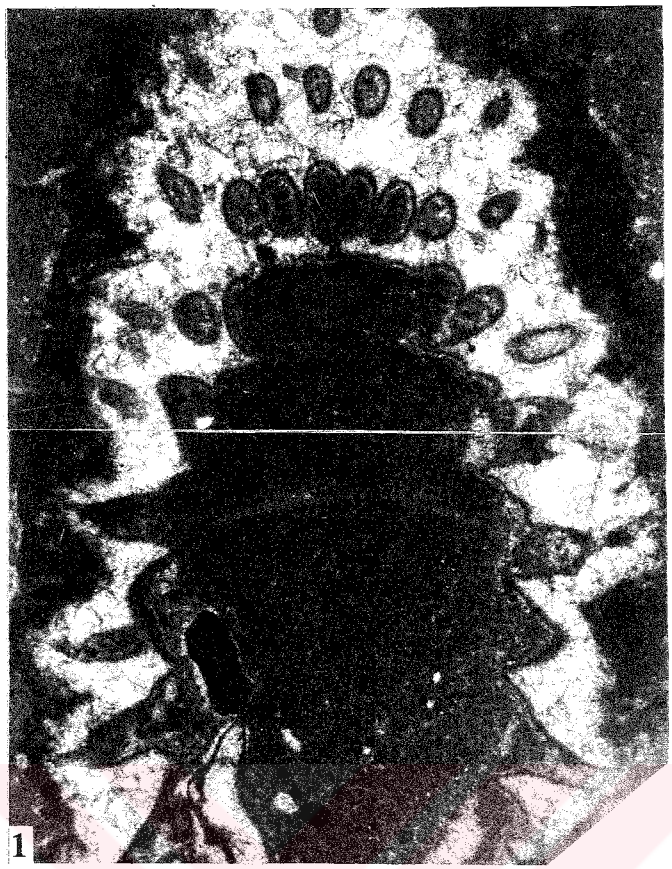
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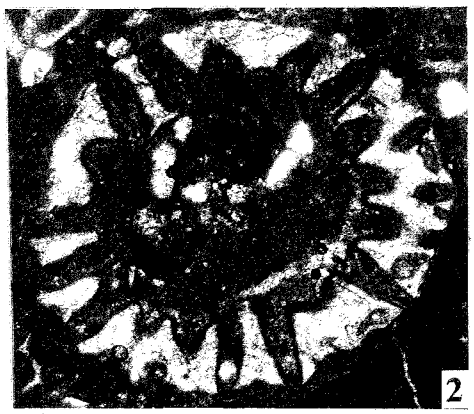


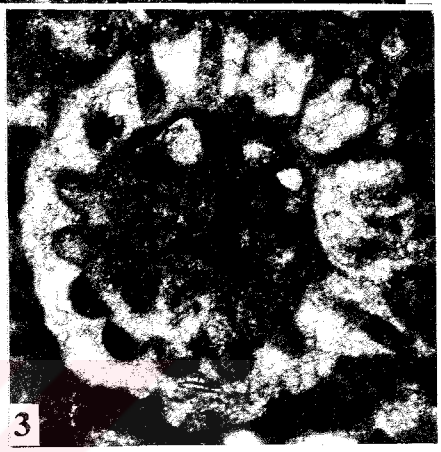
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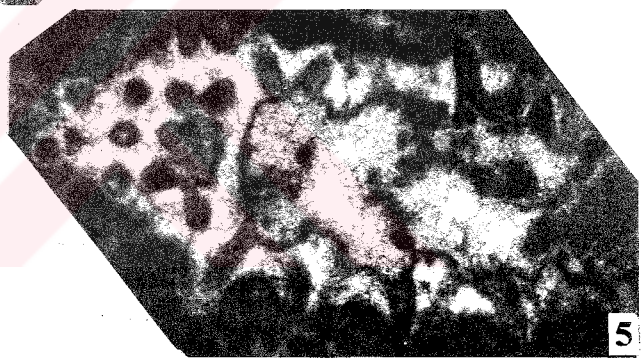
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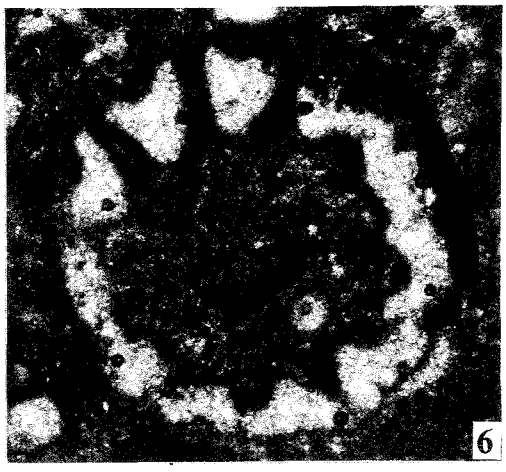

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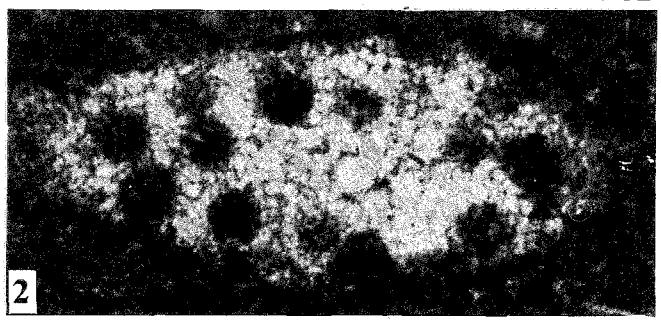

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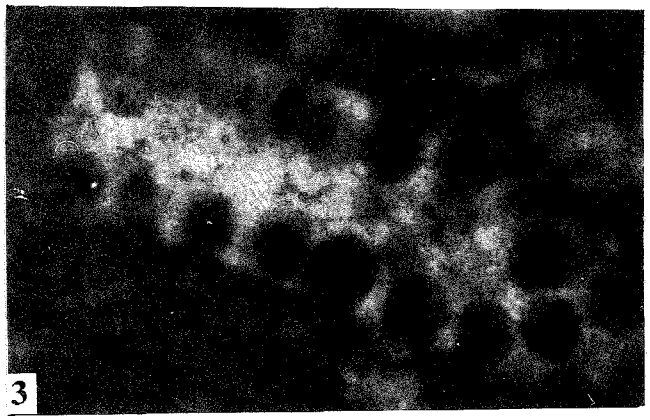

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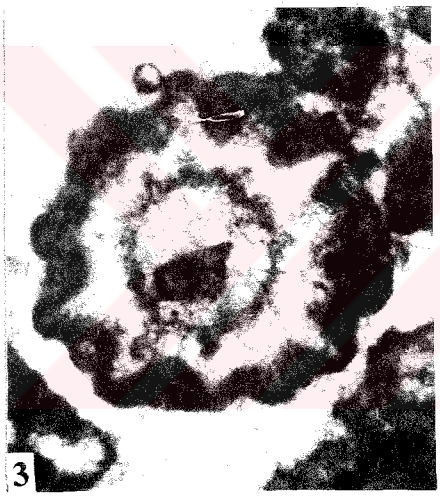

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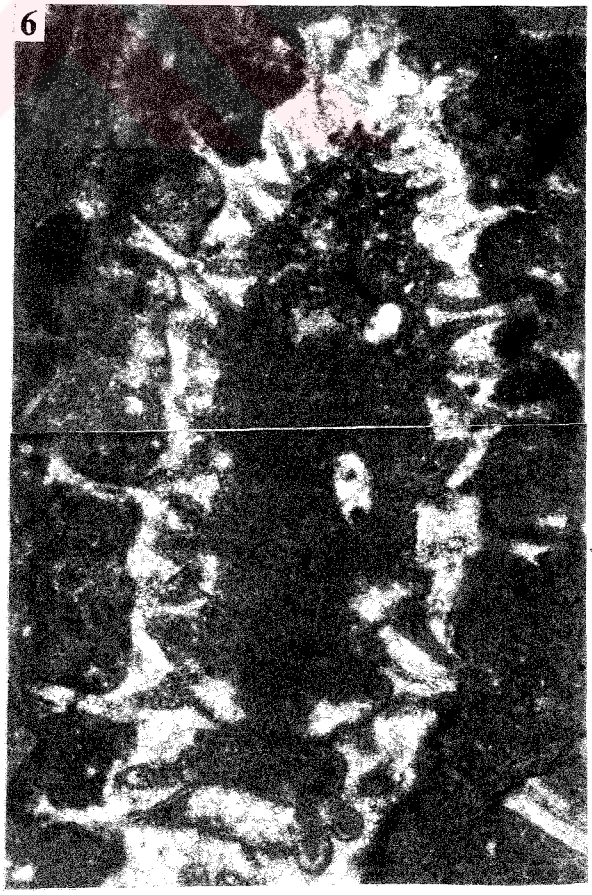

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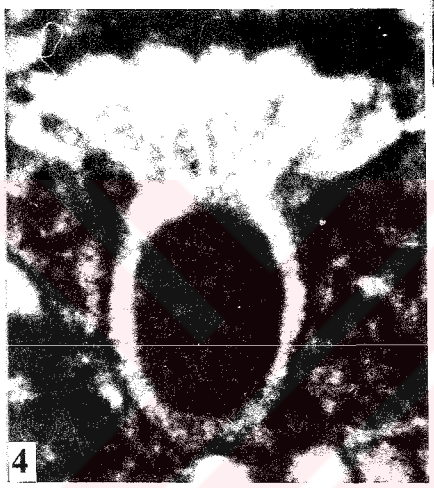

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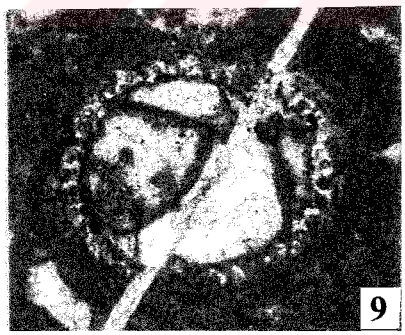

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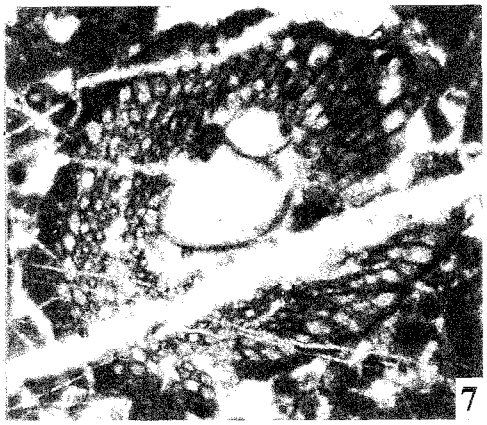

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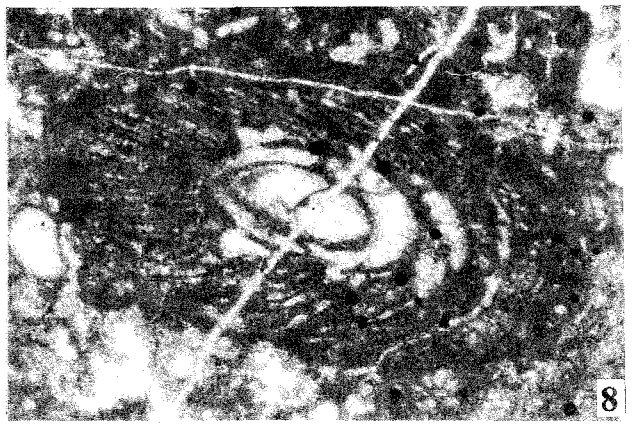

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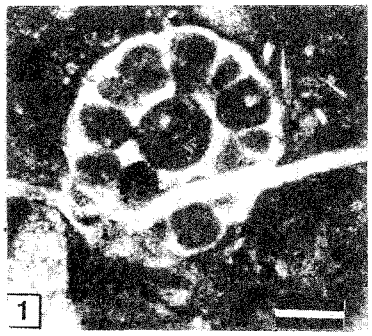

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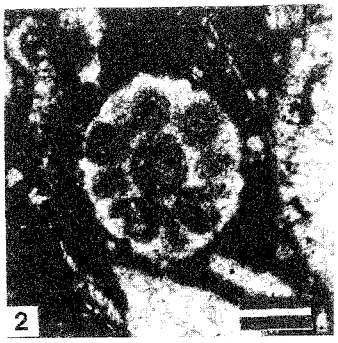

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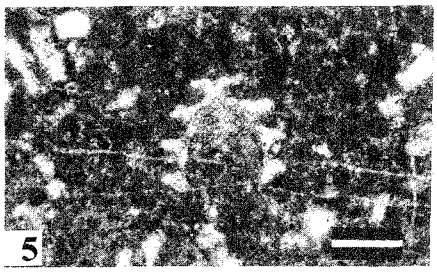

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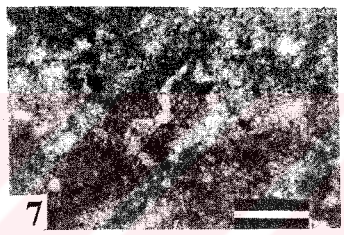

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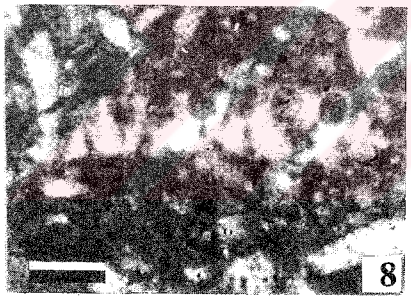

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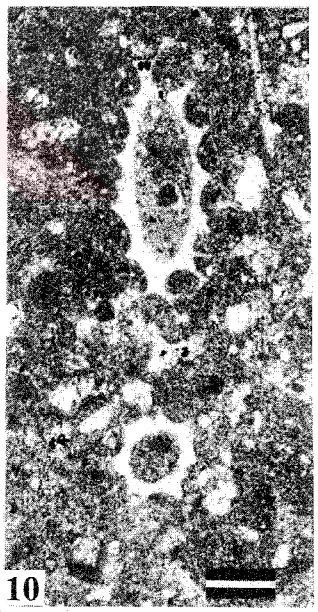

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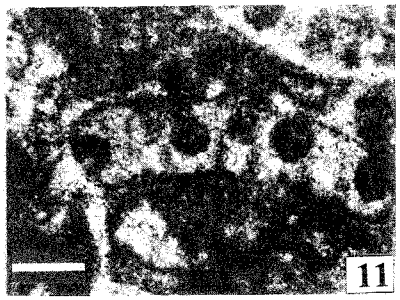

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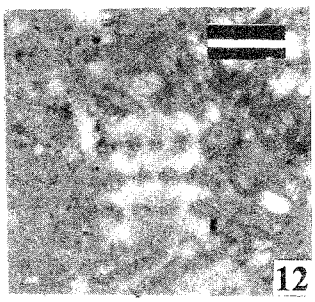

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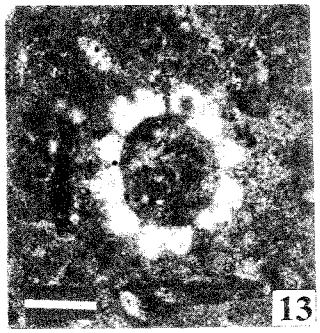

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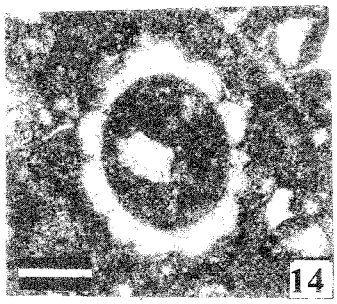

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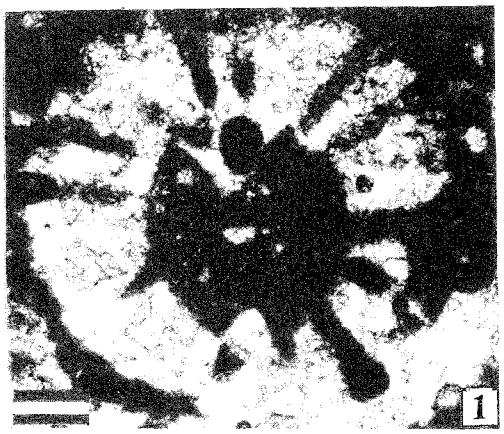

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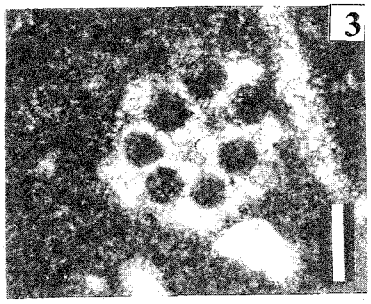

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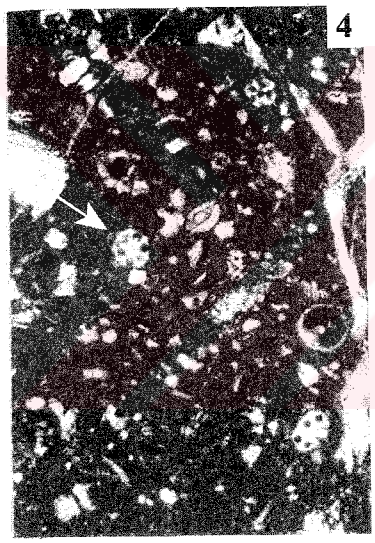

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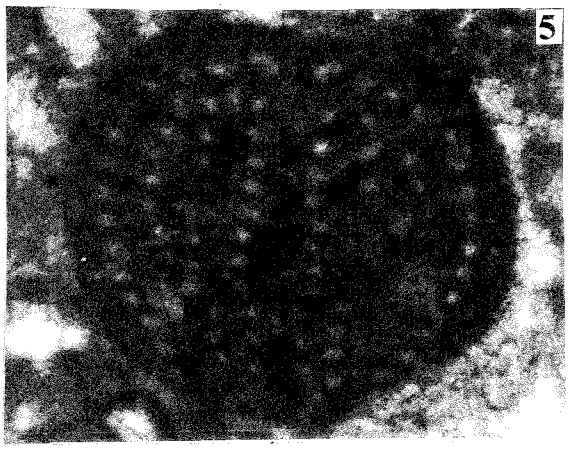

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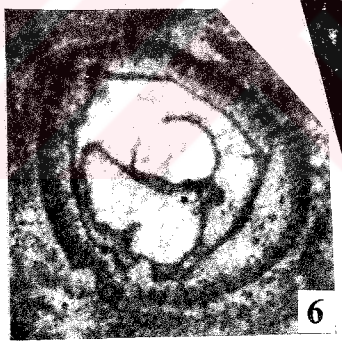

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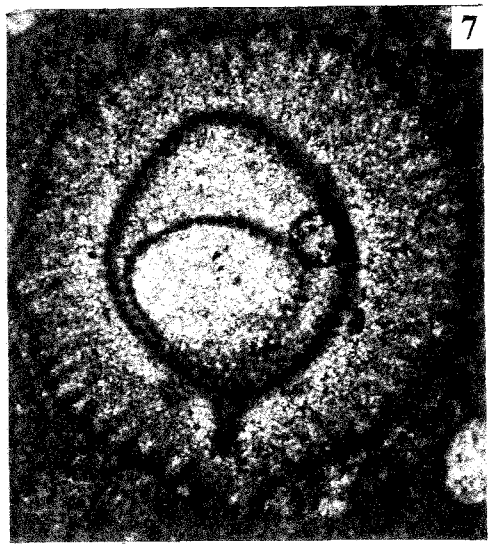

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