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PRE-NEOGENE STRATIGRAPHY OF THE KARABURUN PENINSULA (W OF İZMİR TURKEY)

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ABSTRACT.- Pre-Neogene rock units in Karaburun Peninsula are represented by a relatively autochthonous succession of Paleozoic-Mesozoic age and various tectonostratigraphic allochthonous units. Küçükbahçe Formation forms the lowermost Paleozoic unit of the "autochthonous" succession and is made up of Cambro? - Ordovician detritic rocks in turbiditic nature. It is overlained by Silurian-Carboniferous aged Dikendağı formation with a graditional contact which is characterized by abundant chert lydite content and Visean-Bashkirian aged Alandere formation which is represented by detritic and carbonate rocks. These units are cut by Karaburun granodiorite of Early Triassic age. The Paleozoic basement is unconformably overlained by a Mesozoic aged succession which commences with the Gerence formation consisting of conglomerate and/or *Naticella* bearing sediments of "vermicular facies" of Scythian age and the succession continues with carbonate dominant detritic deep marine sediments of Anisian age. Toward the end of Anisian, this units first grade into mainly the red micritic carbonates of the "ammonitico rosso facies" and then grade into the neritic carbonates of Camiboğazı formation of Early Ladinian age. The Camiboğazı Formation is gradationally overlained by *Megalodon* bearing Güvercinlik formation of Carnian-Rhaetian age consisting of stromatolitic dolomite, sandstone, mudstone and iron/bauxite pisolite bearing conglomerates. The succession continues with Nohutalan formation which consists of neritic carbonates with *Paleodasycladus* and *Cladocoropsis.* It is unconformably overlained by the Albian-Aptian aged Aktepe formation fossils. After a probable hiatus, Campanian-Maastrichtian aged Balıklıova formation unconformably covers the former units. Balıklıova formation consists of Karahasan limestone member of shallow marine limestones in the lower, and pelagic limestones-marls in the middle, and Haneybaşı member of sandstone-mudstone alternation of flysch facies in its upper levels. Tekedağı formation, İdecik unit, İzmir flysch and Yeniliman serpentinite are tectonically related with relatively autochthonous Paleozoic and Mesozoic rock units. (Late?) Permian aged Tekedağı formation is made up of detritic sediments and bioclastic limestones. Ladinian-(Early) Carnian/(Norian?) aged İdecik unit is made up of detritic sediments and spilitic lavas. Campanian-Early Tertiary (Danian?) aged İzmir flysch is a blocky flysch. All of these units are unconformably overlained by various rock units of Neogene and Quarternary age.

Key words: Karaburun, lydite, Permian, Scythian, ammonitico rosso

INTRODUCTION

1/25.000 scale geological mapping, revision, correlation and compilation studies were conducted between 1996 and 1998 on 1/100.000 scale sheets of K16, K17, L16, L17 of Karaburun Peninsula.

This work contains "Stratigraphy of Pre-Neogene rock units" on 1/25.000 scale sheets of K16-c1,2,3,4, K17-d1,d4, L16-a4,b2,b3,b4,c1, c2,d4 and L17-a1,a2,a3,a4,d1,d2,d3,d4*. Geological mapping of the peninsula were completed, and the studies carried out by Brinkmann et al. (1972), Erdoğan et al. (1990), Kozur (1995, 1998), İşintek et al. (1998 *b*), and İşintek and Altıner (1998) were used to define the Pre-Neogene rock units. Neogene units are simplified as sedimentary, volcanic, pyroclastic and tuff lithologies, and "Uzunkuyu quartz monzodiorite" was identified in this study.

This work was further presented as a report to General Directorate of Mineral Research and Ex-

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ploration (Çakmakoğlu and Bilgin, 2003) and as a "poster" to 57th Geological Congress of Turkey (Çakmakoğlu and Bilgin, 2004).

PREVIOUS WORKS

First detailed geological study and mapping began by Kalafatçıoğlu (1961) and the studies in the Karaburun Peninsula continued for many years. Kalafatçıoğlu (1961) revealed a stratigraphy beginning from Devonian (Figure 3) in his 1/100.000 scale geological map of the peninsula. Between 1965 and 1969, 1/25.000 scale geological mapping, drilling exploration and a mercury mine exploration have been carried out in north of the peninsula. These studies are generally based on the studies of Kalafatçıoğlu (1961); but more detailed informations about the stratigraphy of the peninsula, especially on Paleozoic, have been provided by PhD studies. Detailed studies on the stratigraphy and structural features of Karaburun Peninsula were conducted by Brinkmann et al. (1967,1972,1977), Lechner et al. (1967), Lechner (1969), Salah (1970), Gümüş (1971), Düzbastılar (1978), Konuk (1979), Güvenç and Konuk (1981), Akbulut (1972, 1980), Erdoğan (1985, 1988, 1990 *a, b*), Erdoğan et al. (1985), Güngör (1989), Erdoğan et al. (1990), Erdoğan and Güngör (1992), Koca et al. (1992), Kaya and Kozur (1995 *a, b, c*), Kozur and Kaya (1995), Kozur (1995, 1998), İşintek et al. (1998 *a, b*), İşintek and Altıner (1998, 2001), Kaya and Rezsü (2000), İşintek (2002), from 1967 to present (Figure 3).

"AUTOCHTHONOUS" UNITS

PALEOZOIC

Relatively "autochthonous" Paleozoic succession of Karaburun Peninsula is represented by three distinct formations transitional into each other, from Ordovician(?) to (Middle) Carboniferous. The lowermost Küçükbahçe formation is composed of the intercalations of greenish gray, yellowish brown, fine pebbly conglomerate, sandstone and siltstones. Overlying, Dikendağı formation has intercalations of green, greenish gray, gray and yellowish brown colored sandstone, siltstone and black cherts. At the top of the succession the Alandere formation is represented by siltstone, marl and limestone in the lower levels, and fossiliferous dolomitic limestone and limestone with rare cherts in the upper levels. Karaburun granodiorite of Early Scythian cuts the Dikendağı formation.

Küçükbahçe formation (Ok)

The formation includes slightly oriented sandstones, fine gravelly conglomerates and silt stones. The unit has been defined as "Küçükbahçe formation" of probable Ordovician or Cambro-Ordovician age firstly by Kozur (1998). Among previous researchers, Kalafatçıoğlu (1961) identified the detritic rocks of the old basement as "Devonian graywackes". This definition was later used in more general sense and for various aged rock units by Höll (1966) and many other researchers. Lechner et al. (1967) and Brinkmann et al. (1972) used "Devonian graywackes" and Gümüş (1971) used "Yayla graywacke unit"; and finally Konuk (1979) accepted this unit Triassic in age and defined as the "Karareis Assemblage". Erdoğan et al. (1988, 1990) constituted the"Karareis" and "Gerence" formations of Scythian-Anisian and, "Alandere formation" of Carboniferous in the "Denizgiren Group which first two usually contain detritic and carbonate rock units (Figure 3).

Küçükbahçe formation is a very uniform unit and has an intercalation of fine-grained conglomerate, siltstone and mudstones. Relatively lower parts contain fine-grained conglomerates while upper parts contain both of intercalated sandstone and mudstone levels. Generally greenish gray and yellowish brown colored unit is thin-medium bedded layered and turbiditic. In addition, it has a slightly oriented texture and bears very low grade metamorphic effects.

The base of the Küçükbahçe formation is not observed in the study area and Dikendağı formation overlays this with a gradational contact. (Figures 1 and 2). Because of the both two

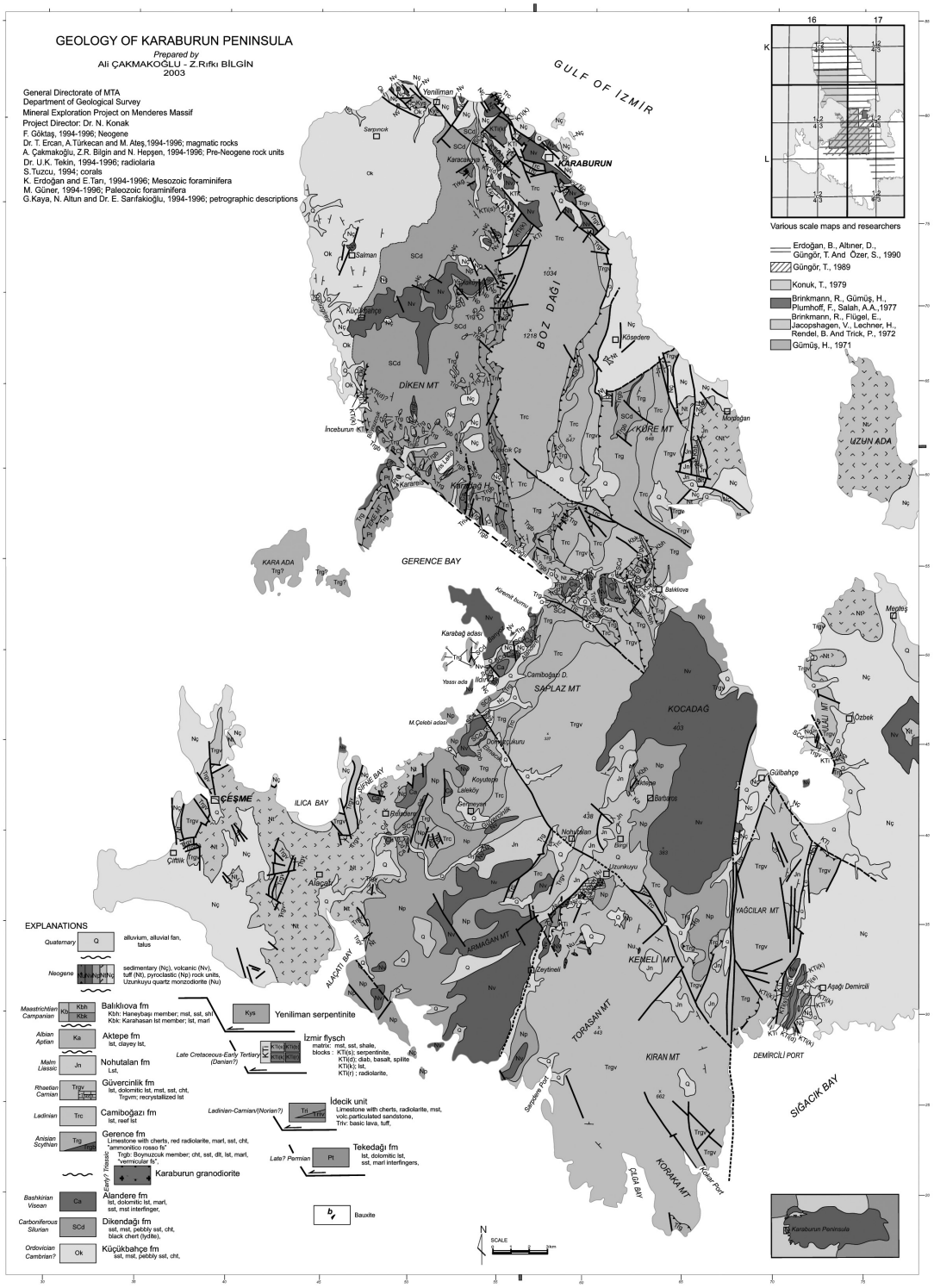


Figure1- Geological Map of Karaburun Peninsula.

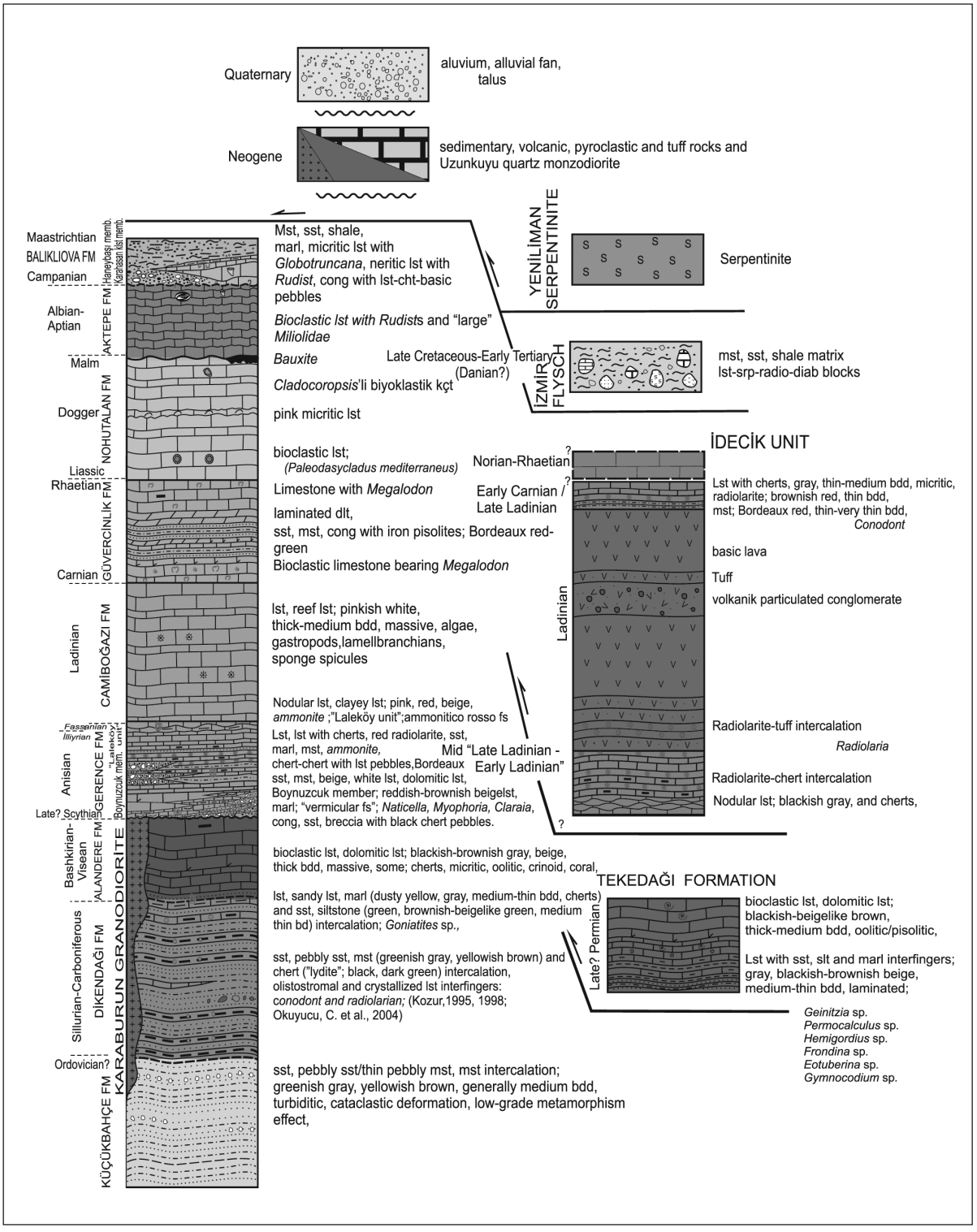


Figure 2- Generalized Stratigraphic Section of Pre-Neogene rock units on Karaburun Peninsula.

formations have similar rock types, the contact can be difficulty identified. However, first levels of the layered black cherts ("lydite":Gümüş, 1971; Brinkmann et al., 1972; Kozur, 1995 and 1998) are accepted as key beds. The formation has no fossils. Gradationally overlaying Dikendağı formation has been intupreted as the lowest levels of Silurian (Kozur, 1995), and Kozur (1995,1998) suggests that the unit would be Ordovician or Cambro-Ordovician. In this study the formation is considered as Ordovician in age.

It is interpreted that the unit have been deposited on a relatively deep marine environment with turbiditic currents.

Dikendağı formation (SCd)

The formation includes the intercalations of greenish gray to yellowish brown colored slightly oriented sandstone, coarse-grained sandstone, siltstone and mudstones with dark green, white and generally black cherts (lydite). The succession is firstly identified as Dikendağı formation in this study. The unit is described as "Devonian graywackes" by Kalafatçıoğlu (1961), Lechner et al. (1967) and Brinkmann et al. (1972), as "Yayla graywacke unit" of probable Devonian-Lower Carboniferous age by Gümüş (1971), and as "Karareis formation" of Lower Triassic by Konuk (1979). Erdoğan et al. (1990) separated the unit into two parts, as "Alandere formation and Scythian-Anisian aged "Denizgiren group". Kozur (1995) described that the unit is usually composed of siliciclastic turbidites and olistostrome, and named the gradational parts of the Alandere formation as "Döşemealtı formation" (Kozur, 1998).

Clastic parts of the unit varies from gray, greenish gray to yellowish brown. Sandstones have various-sized clastics ranging from coarse to fine grains. Grains are poorly to medium sorted and sub-rounded. There are some olistostromal levels within the clastic parts. Gravels and boulders in these levels are various-colored crystallized limestones with no definite age and few sandstones. The unit does not show any significant lateral change.

Based on including conodont, radiolarian, and Ammonite fossils in the uppermost levels (*Goniatites* sp.), the unit has been assigned to Silurian-Carboniferous (Visean) age (Kozur, 1995) (Figure 3). Conodonts and radiolarians of Upper Devonian (Frasnian-Famennian) were determined within the black cherts (lydites), which are just below the several meters thick quartzitic sandstone and marls bearing *Naticella* (Scythian unconformity) (Figure 12) (Okuyucu et al., 2004). In this study, Silurian-Carboniferous (Visean) age is accepted for Dikendağı formation.

Dikendağı formation is gradational with the Küçükbahçe formation in the below, and Alandere formation in the above. Clastic rocks observed at top levels are intercalated with cherty limestones and pass into the Middle Carboniferous limestones (Figure 4). All of these are unconformably overlain by Gerence formation.

Rock type and microfaunal features of the unit indicate that it was deposited on a moving slope/ deep marine environment with turbiditic currents.

Alandere formation (Ca)

The unit includes sandstone and marls, interfingered with limestone, dolomitic limestone with replacement cherts. The unit was described as Lower Carboniferous (Upper Visean-Lower Namurian) "black crystalline compact bedded limestones" by Kalafatçıoğlu (1961), as "Kohlenkalk" by Lechner et al. (1967) and as "Tınaztepe" and "Alandere", formations by Gümüş (1971). Erdoğan et al. (1990) constituted these two formations into "Alandere formation" (Figure 3).

The unit begins by an intercalation of brownish, beige-green medium to thin bedded sandstone, siltstone, and gray, white, dusty yellow, yellow and red, medium to thin bedded lime-

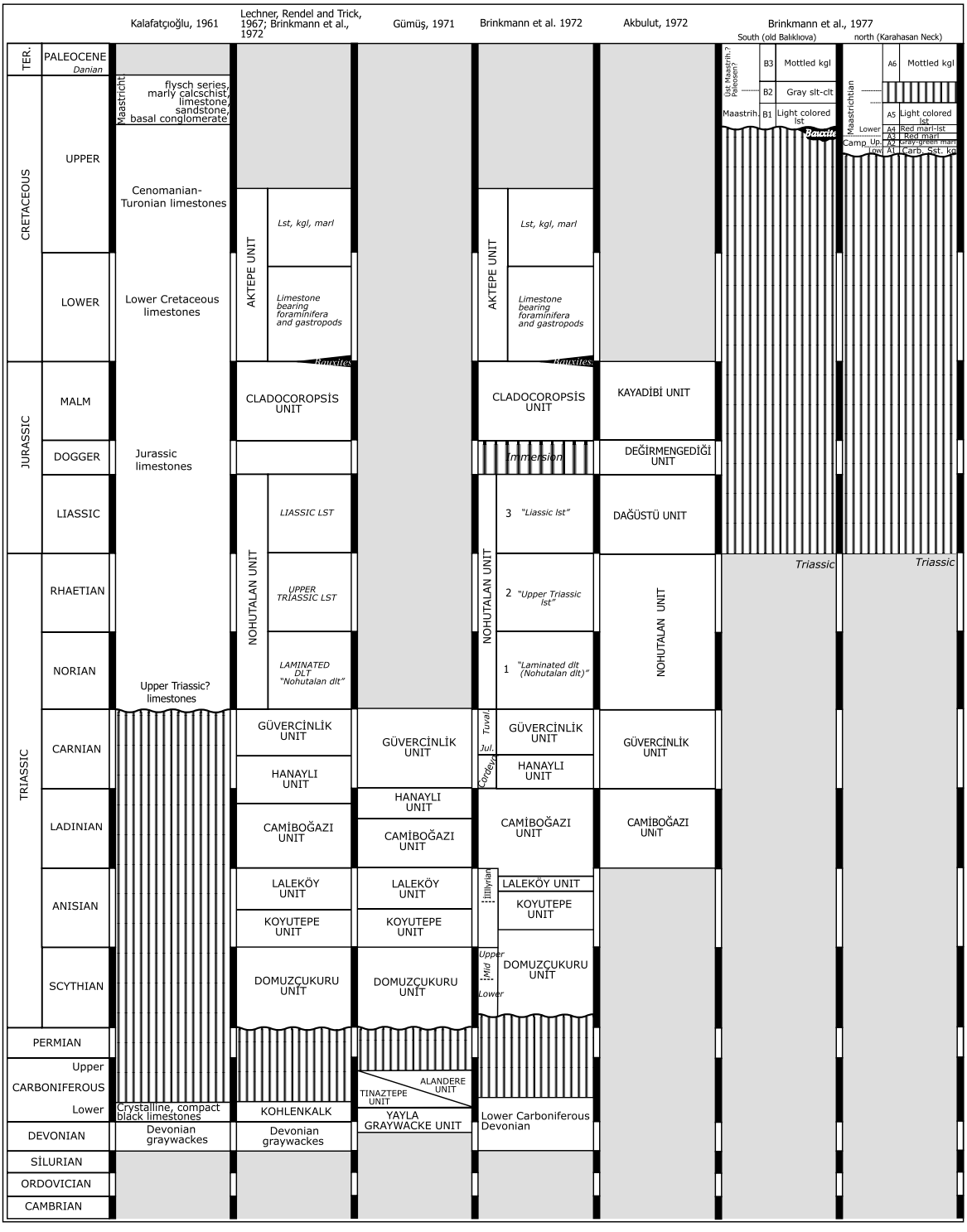


Figure 3- Stratigraphic correlation charts of previous studies.

Figure 3- Contioune.

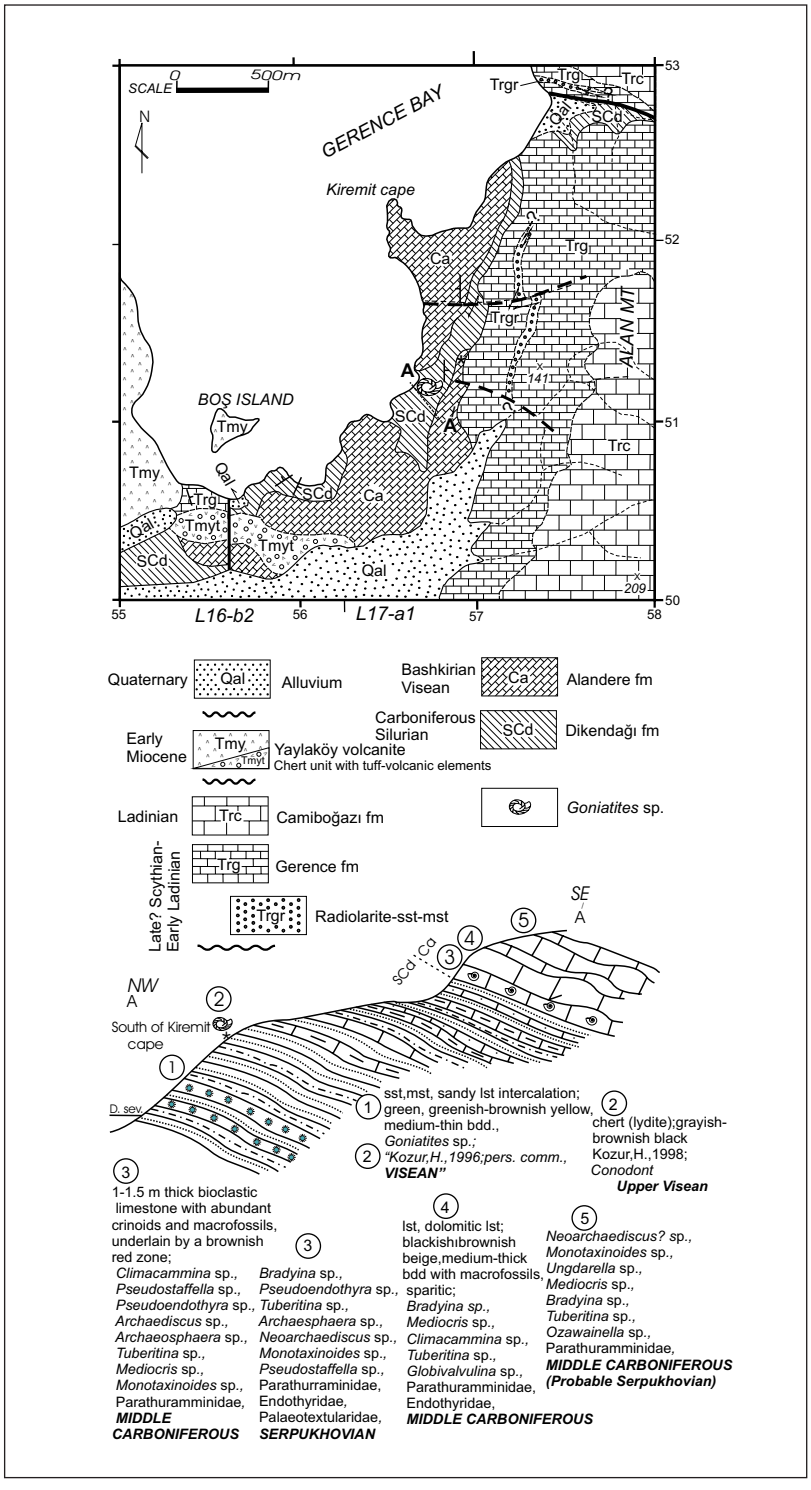


Figure 4- Dikendağı formation and Alandere formation; geological map, stratigraphic relation and fossil content.

stone, sandy limestone and marl with often chert bands. The unit laterally pass into generally grayish black, gray and thick to medium bedded limestones with abundant corals and crinoids. Upward, it passes into the blackish gray and some beige-gray laminated dolomitic limestones with abundant fossils and blackish to brownish replacement cherts. Dolomitic limestones show some crystallized, micritic and oolitic textures. The unit ends by dark gray to grayish-brownish black and some beige thick bedded, massive limestones with secondary calcite fillings, some replacement cherts and silica nodules at top levels.

The unit is gradational with lower Dikendağı formation and is unconformably overlain by Gerence formation of Late (?) Scythian-Early Ladinian age.

Alandere formation is rich in fossils. Fossils of *Archaediscus* sp., *Archaesphaera* sp., *Bradyina* sp., *Climacammina* sp., Endothyridae, *Fusulinella* sp., *Globivalvulina* sp., *Haplopragmella* sp., Lasiodiscidae, *Lasiodiscus* sp., *Mediocris* sp., *Millerella* sp., *Monotaxinoides* sp., *Neoarchaeodiscus* sp., *Ozawainella* sp., Paleotextularidae, Parathuramminidae, *Pseudoendothyra* sp., *Pseudostaffella* sp., *Qasituberitina* sp., *Tuberitina* sp., *Ungdarella* sp. give Lower-Middle Carboniferous age to the unit. The unit has been dated as Lower Carboniferous (Upper Viesan-Lower Namurian) by Kalafatçıoğlu (1961), Carboniferous/Visean by Lechner et al. (1967), late Lower Carboniferous-Visean- early Upper Carboniferous by Gümüş (1971), early Middle Carboniferous (Bashkirian) by Erdoğan et al. (1990) and as Serpukhovian-Bashkirian by Kozur (1995). According to these, a time range extending from middle Visean to the end of Bashkirian can be considered for the unit.

The formation was started to deposite in a relatively deep, and later in a shallow marine environment where some reefs also occurred.

Karaburun granodiorite (Trkg)

The unit was firstly defined as "Karaburun intrusives" by Türkecan et al. (1998). In previous studies granite intrusions have been reported at the contact between Devonian and Carboniferous by Lehnert-Thiel (1969) and at the top levels of Paleozoic by Yıldız (1969). At the south of Yeniliman, there are several outcrops intruding Dikendağı formation of Silurian-Carboniferous on an area of about 1 km2 (Figure 1). According to Türkecan et al. (1998) and Ercan et al. (2000), the unit has phenocrysts of plagioclase, quartz, amphibole, pyroxene, and few orthoclases, and Rb/Sr radiometric age obtained from biotites gave 239,9 ± 2,4 m.y., which indicates a Triassic magmatism. It is suggested that the unit might be Scythian in this study.

MESOZOIC

"Autochthonous" Mesozoic is represented by carbonate, clastic and flysch facies rock units extending from Lower Triassic to Campanian-Maastrichtian on Karaburun Peninsula. Mesozoic units overlaying Paleozoic rock units with an unconformity begins with Scythian and by a deepening process at the end of Upper Scythian -pre-Ladinian, a regular succession is formed composing of carbonates and flysch.

Mesozoic succession is represented by the lowermost Gerence formation of Scythian-Lower Ladinian; Camiboğazı formation of Ladinian; Güvercinlik formation of Carnian-Rhaetian; Nohutalanı formation of Liassic-Malm; Aktepe formation of Cretaceous, and Balıklıova formation of Senonian age. However the most of these units display a regular succession, sometimes they are shown in thrusted character as well. Besides they are also accomodated as blocks or tectonic slices within the İzmir flysch.

Gerence formation (Trg)

The formation is generally composed of detritic rocks and carbonates with cherts. The unit was

firstly identified as "pelagic Triassic" by Brinkmann et al. (1967), and was differentiated as "Domuzçukuru", "Koyutepe" and "Laleköy" units by Lechner et al. (1967) and Brinkmann et al. (1967, 1972). Assuming that these units are lateral and vertical facies changes of a formation, Erdoğan et al. (1990) named these units as "Gerence formation" of the "Denizgiren group" (Figure 3).

Gerence formation don't exhibit same features everywhere at the base. Generally begins by conglomerate, noduled marls with pelecypod and gastropod fossils, sandstone, clayey-silty limestone, brownish gray to dark gray thin-medium bedded "wrinkled" limestones and abundant calcite veins. Upward it is followed by beige to brown, thick bedded algal limestones in 1-2 m thick, interfingered with pinkish beige limestone levels (Figure 5). These levels correspond to Domuzçukuru unit of Brinkmann et al. (1967, 1972). Especially on the central parts of the Peninsula, near Balıklıova-Ildır, there are conglomerates generally consisting of limestone and a scarce red radiolarite pebbles which are underlain by detritic carbonates of the Domuzçukuru unit. Conglomerates are poorly sorted in general and contain sub-rounded, limestone, green cherts and rare red radiolarite pebbles and rare basic magmatic constituents. Matrix is often silt or clay. Just overlying this, mudstones interlayered with limestones in "ammonitico rosso" facies and red radiolarite are shown. These conglomerates can be interpreted with the "second conglomerate" of the Koyutepe unit of Brinkmann et al. (1967, 1972), and large-scale channel fill shale-conglomerate composition of the Anisian succession of Kaya and Kozur (1995 *b*).

At the central parts of the formation, there are various-colored limestones, marl, sandstone, brownish red to beigelike green radiolarite and red pelagic limestone levels interlayered with these. Detrital parts laterally pass into the limestones which are characterized by chert bands at some places.

The unit continues upward by gray, light gray to brownish pink, yellowish white, fissured and fractured limestones in various thicknesses. Some intraformational breccia levels composing of limestone and chert fragments occur at these levels. Particularly toward the south of Karaburun Peninsula turbiditic limestones regularly increase. At top levels, there are generally pink to pinkish red, medium to thick bedded limestones and clayey limestones ("ammonitico rosso facies") with some ammonite fossils and nodules. These uppermost levels of the formation are described as Laleköy unit by Lechner et al. (1967) and Brinkmann et al. (1967, 1972).

Boynuzcuk member (Trgb)

The unit, which was firstly identified as "Boynuzcuk formation" by Konuk (1979), is composed of breccia, conglomerate, sandstone, pebbly sandstone, mudstone, sandy limestone, nodular limestone and marl from bottom to top; It was evaluated as a member in this study.

Breccias include radiolarite-chert and various limestone pebbles. While near Karareis and Erendede localities they are dominated by radiolarite and chert pebbles, apart from here they changes into generally conglomerates characterized by limestone pebbles. Breccias, contain poorly-sorted, from small to large angular pebbles in green to black colours and have often silica, clay and carbonate cement. On the breccias, there is an intercalation of pebbly and sandy limestone and marls containing brachiopod, pelecypod and gastropod fossils. Reddish-brownish beige to greenish yellow limestones/marls contain characteristic Scythian fossils such as *Naticella/Natica* (*Natiria*) *costata* ("dwarf gastropod"), *Myophoria* sp. and *Claraia* sp. (*Pseudomonotis*), characterizing the "vermicular facies". (Figure 6). Brownish-grayish beige to yellowish dark gray, medium to thin bedded limestones of the unit are cross-cut by abundant calcite veins. Poorly sorted and often grain-supported conglomerates are bordeaux red to brownish yellow in

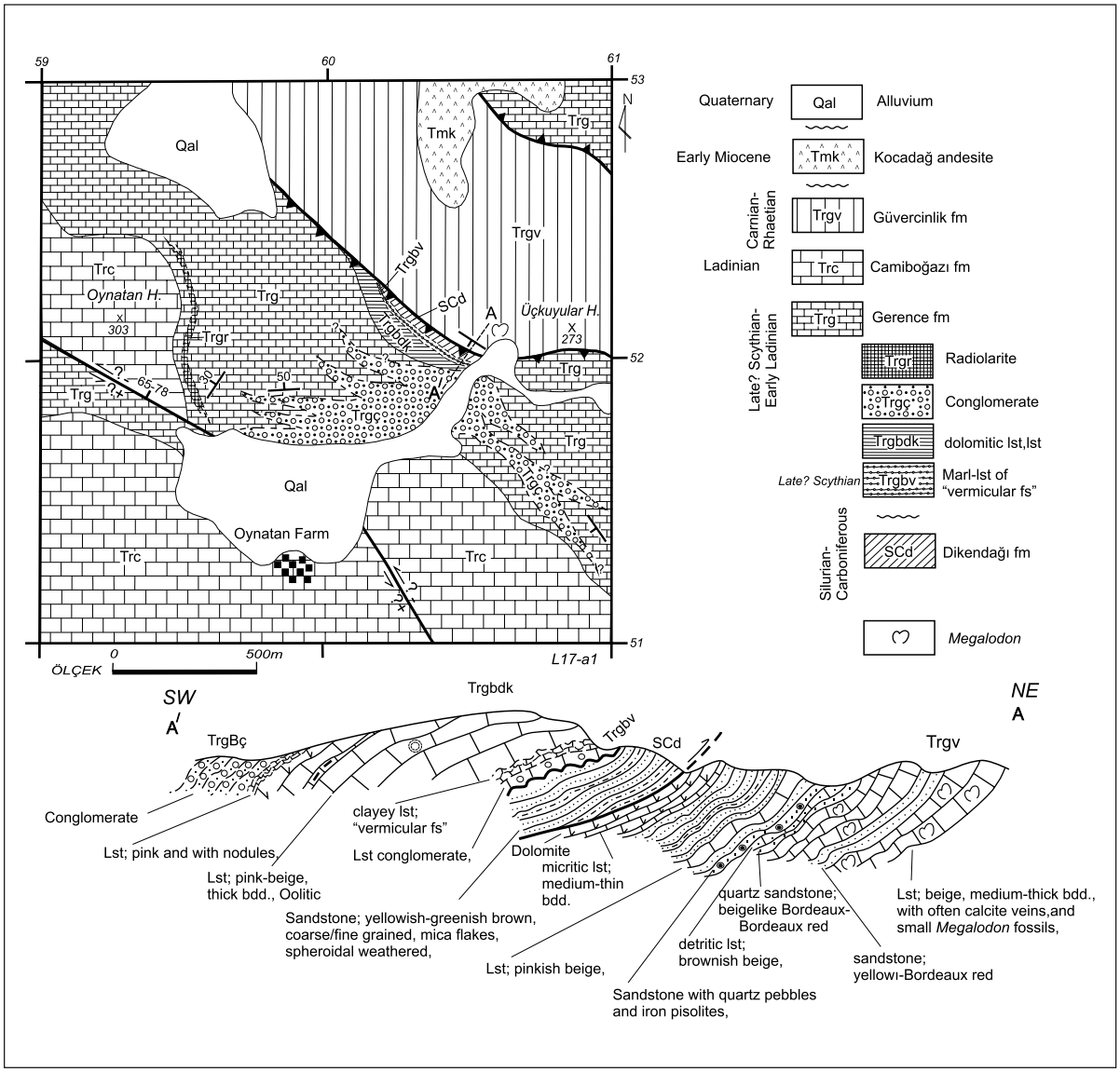


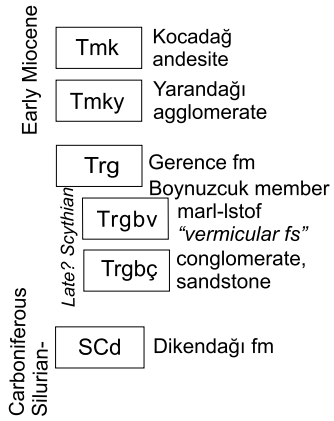
Figure 5- Gerence formation Boynuzcuk member and geological section and map, both are related to submarine channel fills at Oynatan locality.

colours, and medium to thick bedded and some massive, and often contain black chert, white quartz and whitish beige quartzite pebbles and a lesser amount of rounded and sub-rounded pebbles of various limestones. Pebbly sandstones, coarse sandstones and sandstones are shown in bordeaux red to brownish yellow medium-thin bedded layers. (Figures 7 and 8).

Gerence formasyonu unconformably overlays Küçükbahçe, Dikendağı ve Alandere formations. It grades into the overlaying Camiboğazı formation (Figure 8).

Microfossil content of *Cyclogyra*? *mahajeri*, *Spirorbis phlyctaena* and *Meandospira* cf. *pusilla* in the lower levels of the Gerence formation (Fi-

gure 13-1), and macrofossils like *Naticella* sp., *Myophoria* sp., *Claraia* sp. (*Pseudomonotis*) and "vermicular facies" features (Figures 6, 7 and 8) indicate that the unit is Scythian in age. According to determined fossil fauna of *Agathammina* sp., *Aulotortus* sp., *Aulotortus* cf *sinousus, Cayeuxia* sp., *Calcitornella* sp., *Diplopora*? sp., *Duostamina* sp., *Earlandia* sp., *Earlandia tintiniformis*, *Earlandia amplimuralis, Endothyra* sp., *Endothyranella* sp., *Endothyranella wirzi, Frondicularia* sp., *Frondicularia woodwardi, Glomospira* sp., *Glomospira densa, Glomospirella* sp., *Glomospirella fasilis, Glomispirella grandis, Glomospirella semiplana, Macroporella* sp., *Meandrospira* sp., *Meandrospira pusilla, Meandrospira dinarica, "Meandospira" deformata, Meandrospira karnica, Meandrospiranella samueli, Ophthalmidium* sp., *Paraophthalmidium* sp., *Paulbronnimannella whittakeri, Pilammina densa, Planiinvolutina* sp., *Reophax* sp., *Spirorbis* sp., *Spirorbis phlyctaena, Teutloporella*? sp. *Triasina*? sp. *Tubiphytes* sp., *Turriglomina* sp., *Turri-*



glomina mesotriasica, Variostoma sp. and fossils of ammonite and pelagic pelecypods (*Halobia* sp., *Daonella* sp.), date the unit as Late Scythian-Anisian.

In earlier works, the age of the formation have been considered according to the stratigraphic position of Laleköy unit (Lechner et al. 1967; Brinkmann et al. 1967,1972) including red limestones in ammonitico-rosso facies, or to the corresponding units. Brinkmann et al. (1972) accept Upper Anisian age basing on detailed fossil content, which has been described as "Hallstatt facies". Konuk (1979) gives Lower Carnian age to the Güldağ formation in the "Hallstatt facies" and Upper Scythian-Carnian age to the probable formations in the context of Gerence formation. Erdoğan et al. (1990) suggest Scythian-Late Anisian age for Gerence formation including also Laleköy unit. Koca et al. (1992) state that Laleköy formation contains a rich fauna of Late Anisian age (Pelsonian/Illyrian). Kaya and Kozur (1995*b*) state that Anisian succession has Pelsonian ammonitico-rosso facies, olistostromes and also Early Anisian-Late Aegean red cherts; Kozur and Kaya (1995) state that there is an Illyrian-Early Phassanian and Pelsonian ammonitico-rosso facies. Işıntek et al. (1998 *a*) suggest an Anisian age for the lowest levels of the "Laleköy formation" and Ladinian for rest of the formation. Işıntek and Altıner (2001) consider that Laleköy formation were deposited between Middle Anisian (Pelsonian) and Late Anisian (Illyrian)-Ladinian by considering it in Camiboğazı formation.

In this study, the unit is assigned Late? Scythian-Early Ladinian age basing on previous works and fossil findings.

Gerence formasyonu was deposited on coastal, shallow marine, and stable and relatively deep marine environmental conditions.

Camiboğazı formation (Trc)

The unit includes white, pinkish white to light gray massive limestones and has been identified as "Camiboğazı Unit" containing reef or lagoonal limestones by Lechner et al. (1967); and also with same name and content by Gümüş (1971), Brinkmann et al. (1972) and Erdoğan et al. (1990). İşintek and Altıner (2001) separated Camiboğazı formation into Laleköy, Saplaz and Hanaylı units (Figure 3).

At the bottom, the unit begins by a level of pink colored limestones on the top of Gerence formation (Figure 8) and at the top pass to the Güvercinlik formation. The unit is represented by white, pinkish white to pinkish beige, light gray thick bedded and massive limestones. The escarpments and high hills is characteristic morphological featuresof the unit in the study area. It contains abundant algae, gastropods, lamelibranchias, crinoids, sponge spicules and microfossils.

According to the fosil association composing of *Ammobaculites* sp., *Aulotortus* sp., *Aulotortus* gr. *sinousus, Cayeuxia* sp., *Diplotremina* sp., *Duostamina* sp., *Earlandia* sp., *Earlandia tintinifomis, Endothyra* sp., *Endothyranella* sp., *Endothyranella wirzi, Frondicularia* sp., *Frondicularia woodvardi, Glomospira* sp., *Glomospirella* sp., *Lithocodium* sp., *Macroporella* sp., *Miliolipora* sp., *Ophthalmidium* sp., *Ophthalmidium chialingchiangense, Ophthalmidium fusiforme, Pachyphloide*s sp., *Paraophthalmidium* sp., *Reophax* sp., *Trochammina* sp., *Tubiphytes* sp., *Tubiphytes obscurus, Turriglomina mesotriasica, Turrispirillina minima*, the unit is assigned to the Ladinian-Carnian age.

Camiboğazı formasyonu has been dated as Ladinian by Brinkmann et al. (1967,1972), as Ladinian-Carnian by Erdoğan et al. (1990), and as Middle Anisian (Pelsonian)-Late Anisian (Illyrian)-Carnian by Işıntek and Altıner (2001). "Hanaylı unit" is given as Cordevolian (Lower

Carnian) by Brinkmann et al. (1972) and included in Ladinian-Carnian Camiboğazı formation by Işıntek and Altıner (2001), Lechner et al. (1967) and Brinkmann et al. 1967,1972). So the relative age of Camiboğazı formation would be Ladinian by referring to the age of overlaying Güvercinlik formation.

Facies features and fossil content of the unit point to a shallow marine depositional environment. Brinkmann et al. (1972) also state that there were reef and forereef environments in the depositional area.

Güvercinlik formation (Trgv)

The unit includes oolitic limestones with Megalodon, and green, yellow to red siltstone, sandstone and pisolitic conglomerate with iron and bauxite, and light gray laminated dolomite and white dolomitic limestones. A unit with clastic and evaporitic formation is firstly described by Lechner et al. (1967) and Brinkmann et al. (1967, 1972) in this region. While Erdoğan et al. (1990) described Hanaylı unit as laminated dolomites, Brinkmann et al. 1967,1972) named the same levels as "Upper Triassic limestones". İşintek and Altıner (2001) used Hanaylı unit and Upper Triassic limestones (Lower limestone unit) instead of Camiboğazı and Nohutalan formations respectly (Figure 3).

The unit begins by yellowish milky white, massive-thick bedded oolitic limestones with abundant algae at the bottom, and upward continues by an intercalation of thin-medium bedded, pinkish yellow, sandy oolitic/pisolitic limestones with abundant Megalodon fossils, thick-bedded, milky white oolitic limestones with gastropod and small Megalodon fossils, laminated-stromatolitic dolomite, dolomitic limestones and white, thick-bedded limestones with large Megalodon fossils, and greenish-yellowish yellow to brownish red, bordeaux red sandstone, siltstone, mudstone, pebbly sandstone and marl, clayey-sandy limestone, dolomite and white dolomitic limestones; and ends by laminated dolomite and white medium-thick bedded limestones with few replacement cherts. Coquina limestone levels (biorudite) are encountered. The presence of clastic interfingers is the characteristic of the Güvercinlik formation. Matrix is composed of silica and contain iron oxides. Some have cross-beddings. Laterally, Iron/bauxite bearing pisolitic (especially at south of Gönemse), quartz pebbly sandstones are distinctive rock type in the unit. At south of Ulalı Mountain, iron bearing bauxite level is also within the unit. "Uzunkuyu intrusion" of 15,4 ± 0,5 m.y. age has been described as monzodiorite by Türkecan et al. (1998). Ercan et al. (2000) showed recrystallized features around Uzunkuyu-Palamutboğazı (Figure 1; L17-a4) due to its contact metamorphism (Trgvm).

The unit is gradational with lower Camiboğazı formation and upper Nohutalanı formation.

It is suggested that the thickness of the formation is about 250-300 m. There is no significant lateral change in Güvercinlik formation.

According to *Ammobaculites radstadtensis, Auloconus permodiscoides, Aulotortus communis, Aulotortus friedly, Aulotortus gaschei, Aulotortus impressa, Aulotortus sinousus, Aulotortus* sp., *Aulotortus tumidus, Aulotortus turgida, Calcitornella* sp., *Cayeuxia* sp., *Diplopora* cf *annulata, Diplopora* sp., *Duostamina* sp., *Earlandia* sp., *Endothyra* sp., *Endothyranella* sp., *Frondicularia* sp., *Frondicularia woodvardi, Galeanella* sp., *Glomospira* sp., *Glomospirella grandis, Glomospirella parallela, Glomospirella* sp., *Griphoporella* sp., *Lamelliconus multispirus, Lamelliconus procerus, Macroporella retica, Megalodon, Microcodium, Miliolipora cuvillieri, Miliolipora* sp., *Ophthalmidium* sp., *Paraophthalmidium* sp., *Planiinvoluta* sp., *Pokljukosmilia tuvalica, Reophax* sp., *Spiriamphorella districh, Spirorbis phlyctaena, "Tetrataxis" nana?, Thaumatoporella parvovesiculifera, Thecosmilia* sp.,*Triadodiscus eomesozoicus, Triasina hantkeni, Trochammina alpina, Trochammina jaunensis, Trochammina*

sp., *Tubiphytes* sp., *Turriglomina mesotriasica, Volzeia badiotica* fossils, the unit is given as Middle-Upper Triassic in age. Hanaylı unit is given as Lower Carnian (Cordevolian), and Güvercinlik unit as Carnian (Julian-Tuvalian) and "laminated dolomites" as Norian, and "white limestones" as Rhaetian by Brinkmann et al. (1967, 1972). The unit is also interpreted as Norian-Rhaetian by Erdoğan et al. (1990), and as Norian by Işıntek and Altıner (2001). According to the ages of under and overlaying formations and fossil content the age of the Güvercinlik formation has been evaluated as Carnian-Rhaetian.

It is suggested that Güvercinlik formation was deposited in various subenvironments (tidal flat, continental and reef environments) of a very shallow marine environment.

Nohutalan formation (Jn)

The unit, which is composed of limestone, dolomitic limestone and limestone with *Cladocoropsis*, has been differentiated as Nohutalan formation. Brinkmann et al. (1972) studied the unit by separating into three distinct facies, which are "laminated dolomites" (Nohutalan dolomite), "light colored micritic, biopelsparitic/oosparitic limestones", (Nohutalan unit) and *Cladocoropsis* bearing Malm limestones (*Cladocoropsis* unit). Erdoğan et al. (1990) considered the Liassic-Malm and Cretaceous "Aktepe unit", described by Lechner et al. (1967) and Brinkmann et al. (1972) in the Nohutalan formation. Rhaetian-Middle Liassic "Nohutalan formation" was separated into "Kimmeridgian limestones" and "Aktepe formation" by Işıntek et al. (1998 *b*) and Işıntek and Altıner, (1998). Nohutalan formation was also separated into Rhaetian "lower limestone" and Liassic "upper limestone" units by Işıntek and Altıner 2001. In this study, because of Rhaetian limestones is included in Güvercinlik formation and lack of a break between Liassic and Malm and also at Jurassic-Cretaceous boundary (İşintek and Altıner, 1998, 2001), Aktepe formation was separated and Liassic-Malm limestones are accepted as Nohutalan formation (Figure 3).

Nohutalan formation is a uniform unit which is composed of limestone, dolomitic limestone and dolomites. It is generally gray and medium to thick bedded. At the bottom, there are gray, light gray limestones and intercalated smoky dolomite and dolomitic limestones. The central parts of the unit contain gray, light gray to white limestones with rare replacement cherts and rare nodules. These parts show some oolitic, micritic and bioclastic features. It contains pinkish beige micritic-biomicrosparitic limestone with about 2 m thick, passing Malm levels bearing *Cladocoropsis*. This level with no identifiable fossils is similar to Toarcian-Dogger "ammonitico rosso" facies of West Taurids (M. Şenel, 1997; pers. comm.). However İşintek (2002) suggests a time gap approximately lasted 25 million years, by noticing to the bauxite formation between Liassic and Kimmeridgian. Upper levels include gray to brownish gray limestones with abundant algae. The most characteristic feature of these levels is the presence of abundant *Cladocoropsis* sp. Fossils (Figure 9).

Lower contact of the unit is gradational with Güvercinlik formation. The distinction can be made owing to fossil content, color change varying from pinkish white to gray, and bedding thickness varying from medium to thick. It is unconformably overlain by Aktepe formation. Local bauxites are observed at the contact between Nohutalan and Aktepe formations by Brinkmann et al. (1972). Besides, "Aktepe formation directly overlays Liassic limestones of Nohutalan formation with an erosional contact (İşintek and Altıner, 1998).

Brinkmann et al. (1972) measured the unit thickness as 500 m. (250 m for Nohutalan and 250 m for Cladocoropsis bearing portion); Erdoğan et al. (1990) estimated this 500 m. or more. The formation has no lateral change.

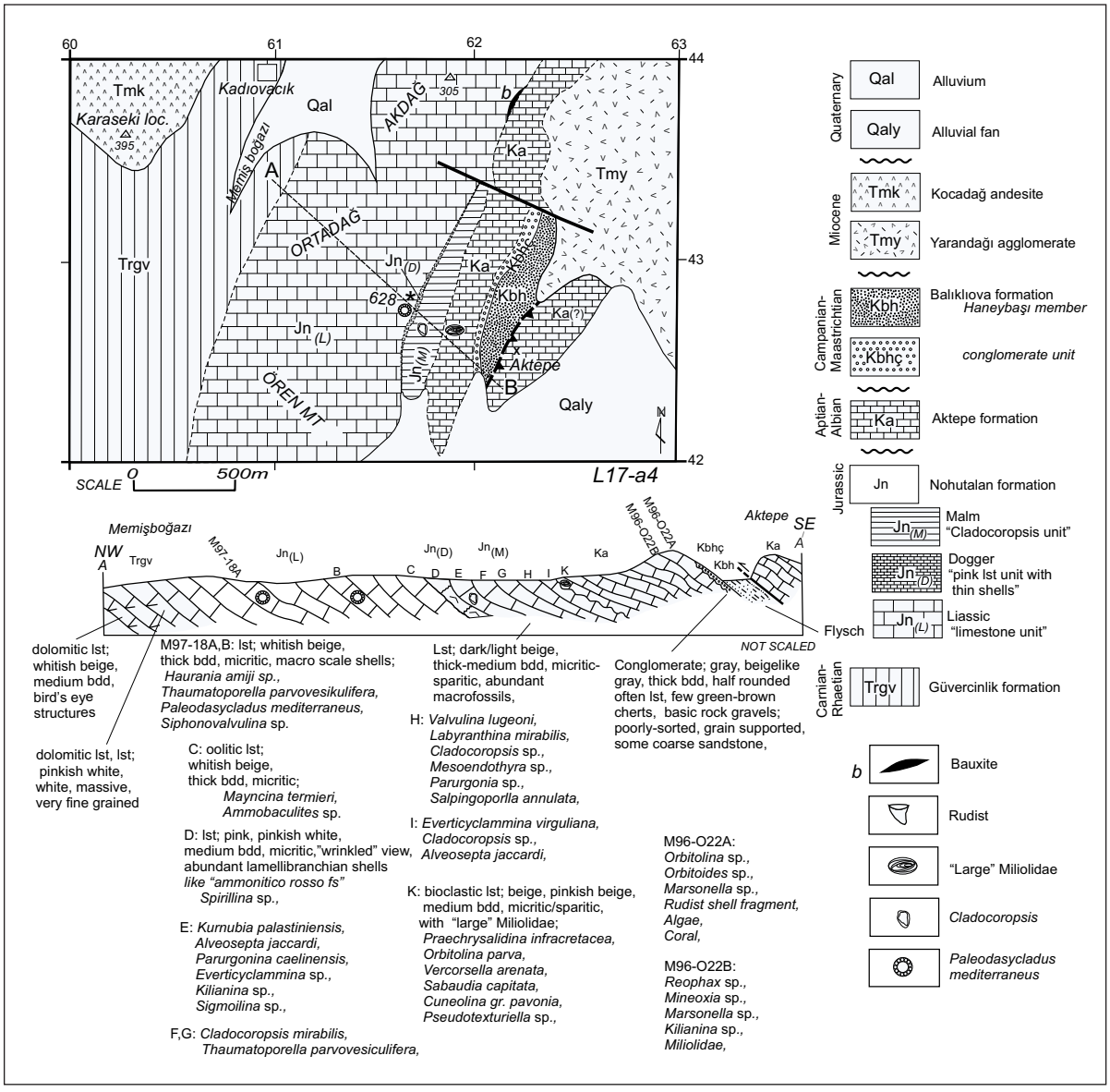


Figure 9- Geological section and map of Nohutalan and Aktepe formations between Kadıovacık and Barboros villages.

The determined fossils are *Acicularia* sp., *Actinoporella* sp., *Agerina* sp., *Agerina martana, Alveosepta jaccardi, Ammobaculites* sp., *Bolivinopsis* sp., *Cayeuxia* sp., *Cayeuxia piae, Cladocoropsis mirabilis, Clypeina jurassica, Conicokurnubia* sp., *Conicospirillina* sp., *Earlandia* sp., *Everticyclamina* sp., *Everticyclammina virguliana, Favreina* sp., *Glomospira* sp., *Glomospirella* sp., *Haurania amiji, Haurania desarta, Kilianina* sp., *Koskinobullina socialis, Kurnubia* sp., *Kurnubia palastiniensis, Labyrinthina mirabilis, Labyrinthina recoarensis, Lenticulina* sp., *Lituosepta compressa, Mayncina termieri, Mesoendothyra* sp., *Nautiloculina* sp., *Neotrocholina* sp., *Ophthalmidium* sp., *Orbitopsella praecursor* (A and B forms), *Orbitopsella primaeva,*

Paleodasycladus mediterraneus, Parurgonina caelinensis, Pseudocyclammina liassica, Protopeneroplis striata, Reophax sp., *Salpingoporella annulata, Sigmoilina* sp., *Siphonovalvulina* sp., *Spirillina* sp., Textularidae*, Thaumatoporella parvovesiculifera,* Tintinidae*, Trochammina* sp., *Trocholina elongata, Tubiphytes* sp., *Tubiphytes morronensis, Valvulinidae, Verneulina* sp. in the formation. Most of these forms indicate Liassic/ Middle Liassic and Kimmeridgian, and some indicate Tithonian, Berriasian and Valanginian. While Nohutalan unit is given as Upper Triassic (Upper Rhaetian)-Liassic and Cladocoropsis unit is given as Malm by Brinkmann et al. (1972), Erdoğan et al. (1990) evaluated the unit Liassic-Albian in age. İşintek et al. (1998*b*) and İşintek and Altıner (1998, 2001) mentioned that the formation is Rhaetian-Liassic. In this study, the age of the Nohutalan formation has been assigned to Jurassic (Liassic-Malm).

Nohutalanı formation was deposited in shallow marine conditions. Upper parts reflect reef environment.

Aktepe formation (Ka)

The formation which includes generally beige, Aptian-Albian limestones, was firstly described as "Aktepe unit" by Lechner et al. (1967) and later by Brinkmann et al. 1972). Erdoğan et al. (1990) consider the unit that was included in Nohutalan formation; İşintek ve Altıner (1998) presented the Aktepe formation as "Aptian-Albian limestones" (Figure 3).

The unit often contains brownish-whitish to pinkish beige, medium to thin bedded, some wrinkled, bioclastic limestones and clayey limestones with abundant yellow calcite veinlets. Often it includes gastropod shells. The most distinctive feature is the presence of identifiable large miliolids.

Aktepe formation unconformably overlays Nohutalanı formation at the bottom, and bauxite formations (İşintek ve Altıner, 1998) are the indicators of this unconformity. However the upper contact is controversial but in this study, taking into consider the age of the (Campanian-Maastrichtian) conglomerate and sandstones of the Haneybaşı member just above the unit, it is suggested that there is a time gap between Aktepe formation and overlaying unit (Figure 9).

Brinkmann et al. (1972) stated that the unit has a thickness of 250 m. The unit which has a limited extent, has no lateral change.

According to *Bolivinopsis* sp., *Cuneolina* sp., *Cuneolina camposaurii, Cuneolina pavonia, Cyclogyra* sp., *Debarina* sp., *Debarina hahounerensis, Glomospirella* sp.*, Miliolidae, Nezzazata* sp., *Nummoloculina heimi, Ophthalmidium* sp.*, Orbitolina* sp., *Orbitolina parva, Praechrysalidina infracretacea, Praeorbitolina lotzei, Pseudocyclammina* sp., *Pseudocyclammina hedbergi, Pseudorhapydionina dubai, Pseudotextulariella* sp., *Pseudotextulariella*? *scarsellai, Sabaudia* sp., *Sabaudia capitata, Sabaudia minuta, Vercorsella arenata* and rudist shells, Aktepe formation is assigned to Aptian-Albian age. The unit has been reported as Lower Cretaceous by Lechner et al. (1967), Barremian to Aptian by Brinkmann et al. (1972) basing on Palaeodictyoconus sp. fossils. While Erdoğan et al. (1990) claimed that Nohutalan and Aktepe formations reach to Albian, İşintek and Altıner (1998) stated that Aktepe formation limestones was Aptian-Albian. In this study the formation has been accepted as Aptian-Albian in age.

Aktepe formation was deposited in a shallow marine environment, particularly at backreef conditions.

Balıklıova formation (Kb)

The formation is composed of carbonate and clastic rock units, and identified as the latest Upper Cretaceous ("Höhere Oberkreide") by Brinkmann et al. (1977). The unit has been

described as "Balıklıova unit" of Late Cretaceous age by dividing into lower "Karahasan limestone member" of carbonates, and upper "Haneybaşı member" of clastic rocks in flysch facies by Erdoğan et al. (1985). In this study the formation name made by Güngör (1989) were preserved as well as member names.

The unit begins by conglomerates or clastic-bioclastic limestones, continues with marn and micritic limestones, and ends with sandstone and mudstones in flysch facies (Figure 10).

Karahasan limestone member (Kbk)

The unit begins with a conglomerate level including pink to pinkish beige, poorly-sorted, sub-rounded limestone pebbles with a thickness of 2-3 meters. Light to dark beige, massive-thick bedded litho-bioclastic limestones at the bottom are common. The lowermost limestone level has bauxite gravels and rudist shells (Figure 10). Upward, there are beige, medium-thick micrites bearing Globotruncana with green cherts/radiolarite clasts, and brownish pink to red, thin-medium bedded, wrinkled limestones with nodules, and also bordeaux red to brownish beige (mottled), thin bedded marls and clastic limestones.

Haneybaşı member (Kbh)

Haneybaşı member in flysch facies, is composed of green, brownish, yellow red, greenish in colour, very thin to medium bedded sandstone and mudstone alternations which, overlays micritic limestones and marls of Karahasan limestone member. Sandstones contain red radiolarite and serpentinite clasts. At southwest of Kadıovacık village, gray to beigelike gray, poorly-sorted conglomerates with a thickness of about 5-10 m are just above the Aktepe formation, and include often sub-rounded limestone, and green to brown, rounded and sub-rounded chert and a few basic rock pebbles (diabase?). This conglomerate level is accepted as a basal conglomerate at the bottom of Karahasan limestone which laterally gets thinner and disappears. Overlying this, brownish yellow to greenish beige sandstones are present.

The formation, unconformably underlain by Gerence, Nohutalan and Aktepe formations, and is also unconformably overlain by Neogene rock units.

Based on the fossils of *Calcarinidae, Disyclina* sp., *Globigerina* sp., *Globotruncaniidae, Globotruncana* sp., *Globotruncana linneiana,* Miliolidae, *Minouxia* sp., *Nacellaria* sp., *Nodosaridae, Nodosaria* sp., *Nummofallotia* sp., *Ophthalmidium* sp., *Radiolaria* sp., *Rosita* sp., *Rotalidae, Rotalia* sp., *Textularia* sp. provided from limestones, the unit has been dated as Senonian. Brinkmann et al. (1977) suggest that neritic and pelagic carbonates are Lower?-Upper Campanian-Lower Maastrichtian. Lower neritic limetones are given as Santonian-Campanian, and upper pelagic limestones as Late Campanian and Early-Middle Maastrichtian by Erdoğan et al. (1985); The lowest parts of Karahasan limestone member are given as Campanian, upper pelagic limestones as Maastrichtian by Erdoğan (1990*b*), and Balıklıova formation as Campanian-Maastrichtian by Erdoğan et al. (1990). In this study, Campanian-Maastrichtian age is adopted for the unit.

Bottom levels of the unit characterize shallow marine, reef and foreslope environments and upward a deepening shelf conditions become dominant.

ALLOCHTHONOUS UNITS

(Late) Permian Tekedağı formation including limestones, dolomitic limestones, sandstones, siltstone and marl interfingers, and ?-Ladinian-Early Carnian (Norian?) İdecik unit composed of basic volcanic rocks, turbidites and carbonates, Late Cretaceous-Early Tertiary (Danian?) Izmir flysch and the Yeniliman serpentinite tectonically rest on the "Autochthonous" rock units.

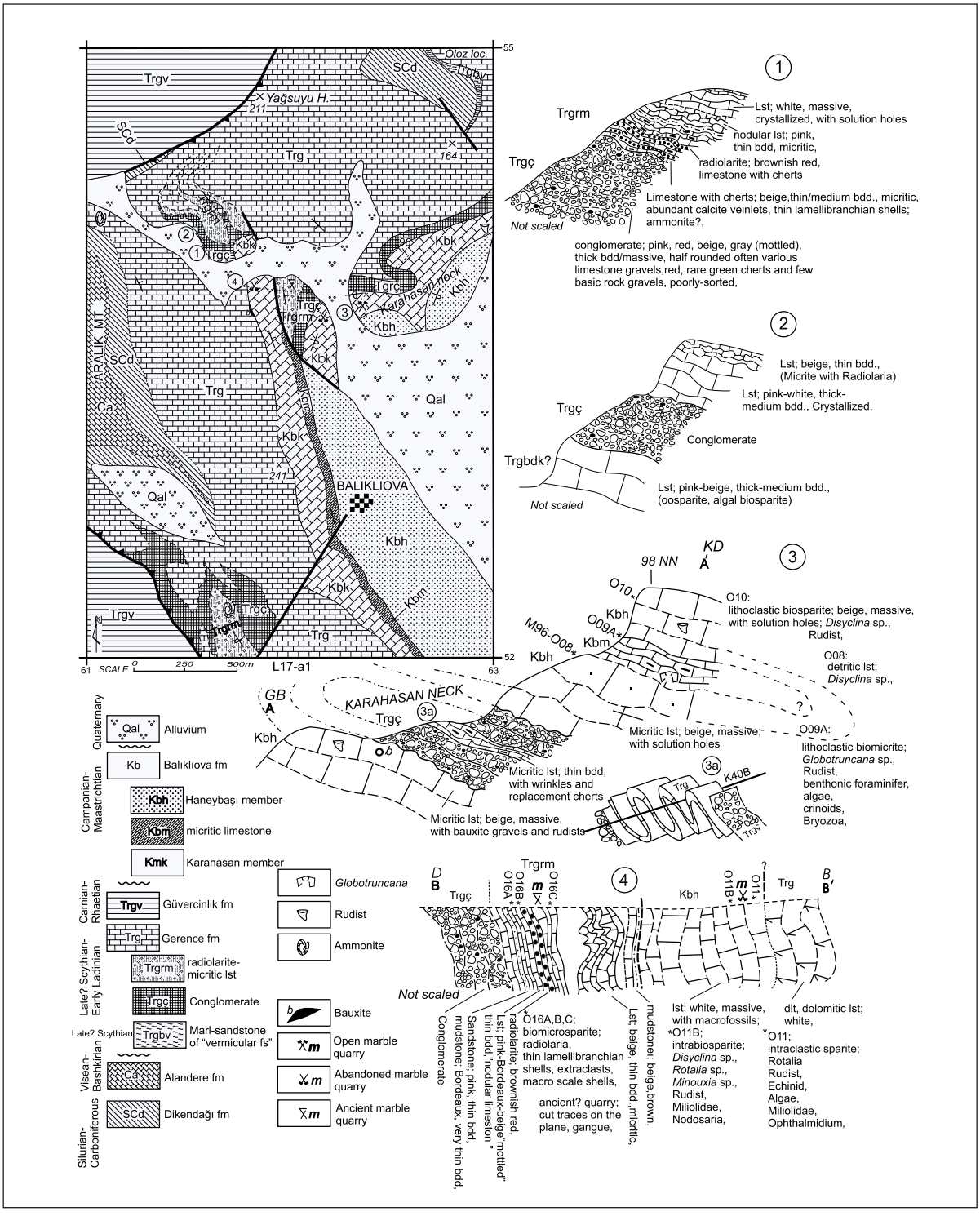


Figure 10- Geological section and detailed geological map of Balıkova formation and Gerence formation araound Balıkova village.

Tekedağı formation (Pt)

The unit of (Late?) Permian age, composed of limestones, sandstone, siltstone and marl interfingers, was firstly described in the study area and called as Tekedağı formation. Garrasi and Weitschat (1968) described Permo-Carboniferous "Tekekaradağ limestones" on Tekedağı Peninsula, which comprises this unit.

Probable lower parts of the formation contain brownish to grayish black limestones and dusty white sandstone and siltstones with mica flakes, and blackish, gray to dark gray, wrinkled laminated clayey limestone-marl interfingers. Because of allochthonous position, succession style is not certainly identifiable. Probable lower parts of limestones are thin to medium bedded, folded, flexured, wrinkled and some oolitic and pisolitic. Probably, upward it passes into the brownish black, thick to medium bedded fosilli feraus limestones, (e.g. gastropods and benthonic microfossils) (Figure 11).

Lower and upper contact of the unit is tectonically related to the limestones of Gerence formation (bearing ammonite, Halobia and Daonella fossils). Tekedağı formation, outcrops as a small tectonic slice in the study area and has no lateral change.

According to the *Eotuberitina* sp., *Frondina* sp., *Geinitzina* sp., *Globivalvulina* sp., *Gymnocodium* sp., *Hemigordius* sp., *Permocalculus* sp., *Pseudovermiporella* sp. fossils the original age of the observable central parts of the unit, has been supposed as (Late?) Permian in age.

Rock type, macroscopic and microscopic faunal features show that Tekedağı formation was deposited in a shallow marine environment.

İdecik unit (Tri)

Including altered greenish brown basic lavas, pyroclastic/volcanoclastic rocks, limestones with nodules and cherts, and red radiolarites, the unit is redescribed as a separated structural-stratigraphic unit namely İdecik unit, due to its stratigraphic position. It is suggested that the "Güldağ", "İdecik" ve "Kayadibi" formations are included in Karareis assemblage by Konuk (1979). The unit has been evaluated as a part of Karareis formation of the Denizgiren group by Erdoğan et al. (1990) (Figure 3).

The unit begins with green basic tuffs resting on gray limestones with some nodules and cherts, and continues by an intercalation of red pelagic limestones and green to yellowish-brownish beige chert and radiolarites with radiolarias. Upward, green tuffs increase and pass into green, brownish green lavas mixed with cherty limestone clasts, (Figure 12).

It is supposed that the unit is tectonically related with lower Dikendağı formation and upper Camiboğazı and Gerence formations with respect to structural and stratigraphic position.

Idecik unit has a visible thickness of about 100 meters. Lateral change is locally, for instance as turbiditic levels within the unit.

Determined *Triassocampe* sp., *Triassocampe ex* gr *scalaris, Pentaspongodiscus mesotriassicus, Pseudostylosphaera* sp., *Pseudostylosphaera fragilis, Parasepsagon variabilis, Sepsagon? aequispinosus, Pseudostylosphaera coccostyla, Actinommidae, Eptingium* sp. cf. *manfredi radiolarian* fossils from red radiolarites at the lower levels of the volcanic rocks, date the unit as middle of Early Ladinian-Late Ladinian; determined conodonts in limestones just above the unit give Early Carnian age (Kozur, 1996; pers. comm.) (Figure 13). Konuk (1979) proposed Carnian age for Güldağ, İdecik and Kayadibi formations. Kozur and Kaya (1995) reported that submarine tuffs are intercalated with the clastic rocks below the Late Ladinian carbonates, and Kaya and Rezsü (2000) reported that Ladinian/Carnian mafic volcanoclastic unit was present.

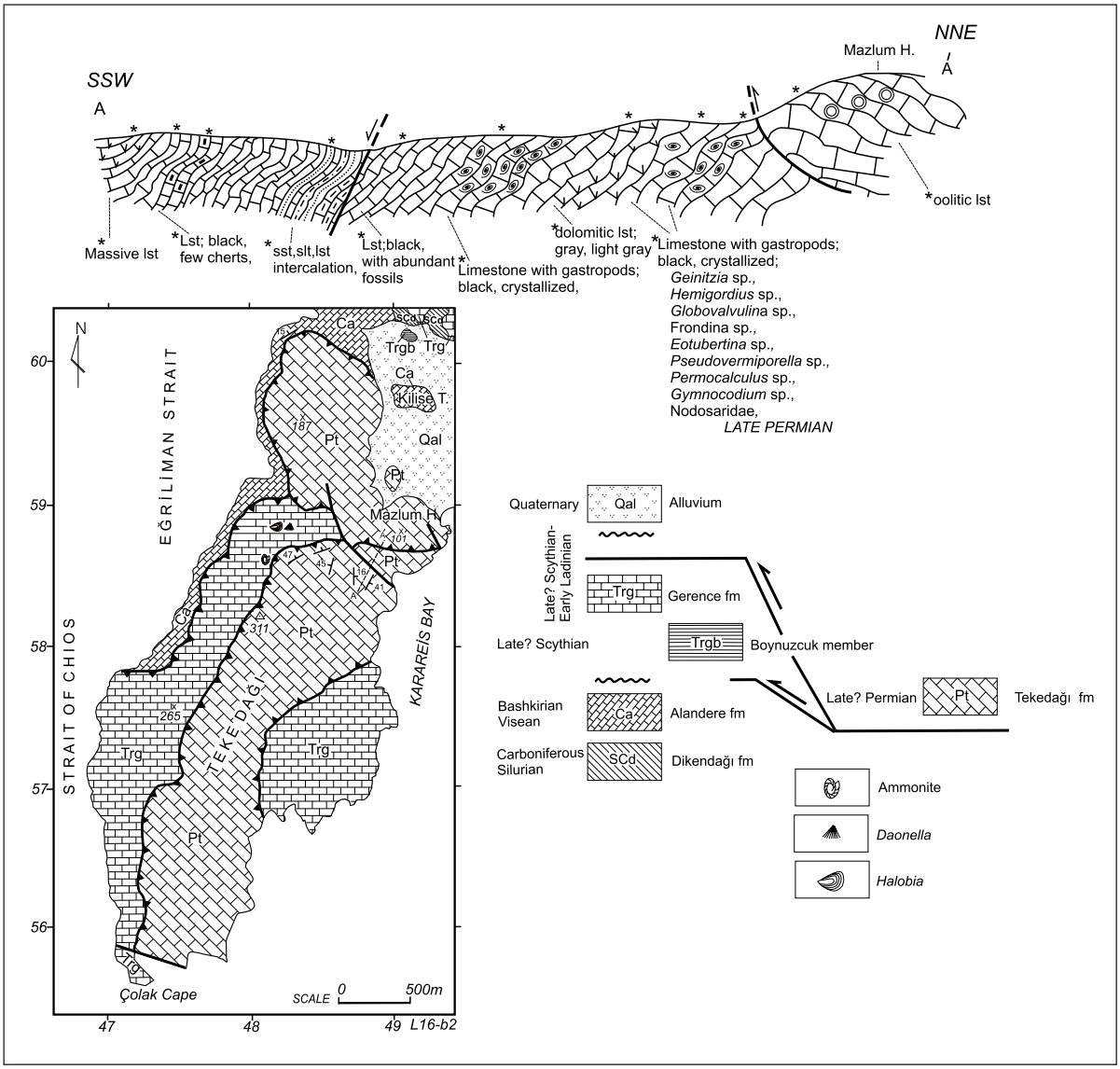


Figure 11- Geological section and map of Tekedağı formation at Karareis Bay- Tekedağı.

According to these data, İdecik unit should be Ladinian-Carnian. At upper levels, limestones with *Galeanella* sp. fossils may be considered to reach Norian (perhaps to younger ages), as shown by Konuk (1979) (Figure 12).

İdecik unit was deposited on an unstable, relatively deep marine environment dominated by active volcanism.

İzmir flysch (KTi)

İzmir flysch is generally composed of a clastic matrix and boulders of various rock types. The unit has a wide distribution in West Anatolia and is named as "İzmir flysch formation" by Öngür (1972), and "Izmir flysch" group by Eşder (1988). Most of the earlier works mentioned the unit, such as "Cretaceous flysch" by Parejas (1940),

Brinkmann (1966), Brinkmann and İzdar (1971); as "Upper Cretaceous flysch" by Akartuna (1962); "Bornova flysch" by Konuk (1977); "Erdemirçay formation" by Konak et al. (1980); "Flysch assemblages" by Yağmurlu (1980); "Cretaceous-Paleogene flysch" by Başarır and Konuk (1981); "Belkahve" and "Çaldağ" formations by Akdeniz et al. (1986); and "Bornova complex" by Erdoğan (1985, 1990 *a, b*) and Erdoğan and Güngör (1992).

It is accepted that Izmir flysch is differed from Haneybaşı member of flysch facies of the Balıklıova formation because of tectonic relation with underlying units and its blocky/olistostromal structure and stratigraphy in the study area as suggested by Erdoğan et al (1990).

The green, brownish green to brownish yellow, pinkish beige olistostromal levels including limestone clasts and blocks with a sandstone-mudstone dominated matrix, and radiolarites (KTir), and generally altered basic volcanic rocks (KTiv), ultrabasic rocks (KTiu), and limestone blocks of various age (KTik) are shown in the unit often relating with Camiboğazı formation. Around Kalecik Mahallesi (K16-c2, c3); Lower Devonian (Fenninger, Von A.1983; Gusic et al. 1984), Anisian-Ladinian (Yarımkaya Ridge, Çöplen Hill; Gusic et al. 1984), Triassic, Triassic-Jurassic?, Triassic-Liassic?, ?-Liassic limestone and Liassic-Lower Cretaceous radiolarite blocks; between İnceburun and Azmak Burnu (K16-c3) Dogger-Kimmeridgian?, Tithonian-?, Carnian?-Liassic, ?-Liassic, Malm, Oxfordian?-Kimmeridgian limestone blocks; at Çalılık locality, in the west of Aşağı Demircili Mahallesi (L17-d2) a Carnian (probably Julian) limestone block interfingered with radiolarite are presented too. All of these are the blocks in various age within the İzmir flysch.

The unit overlap Paleozoic and Mesozoic rock units with a tectonic contact, and is unconformably overlain by Neogene units.

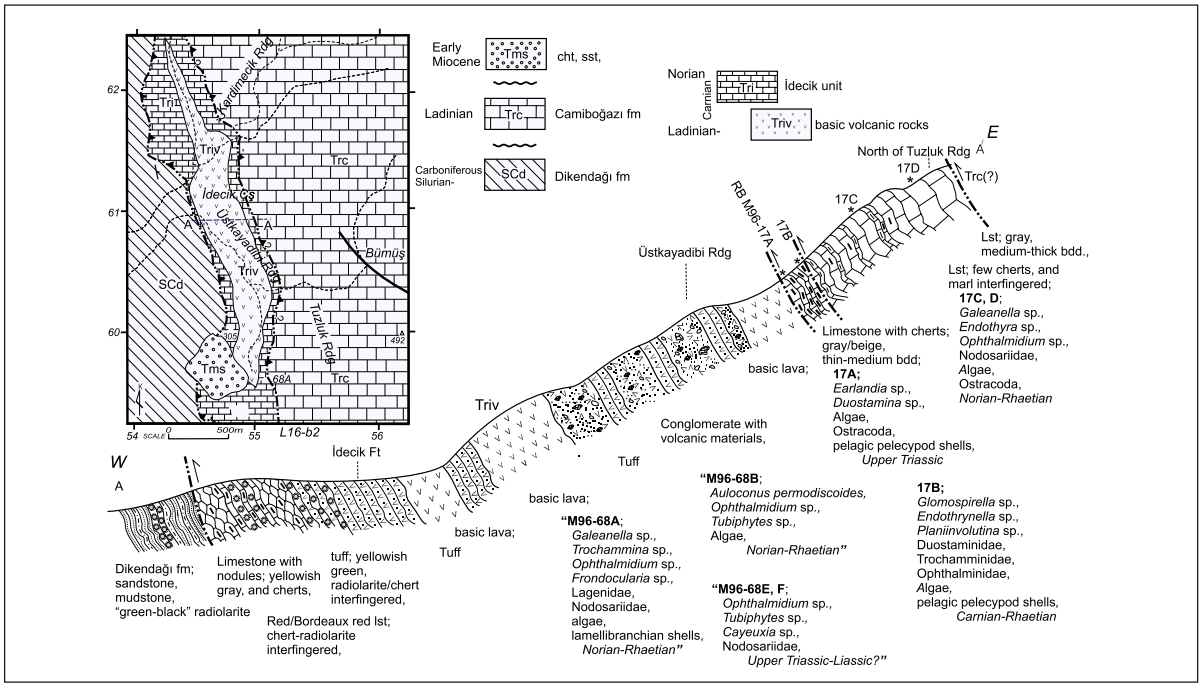


Figure 12- Type section and geological map of İdecik unit at Tuzla locality.

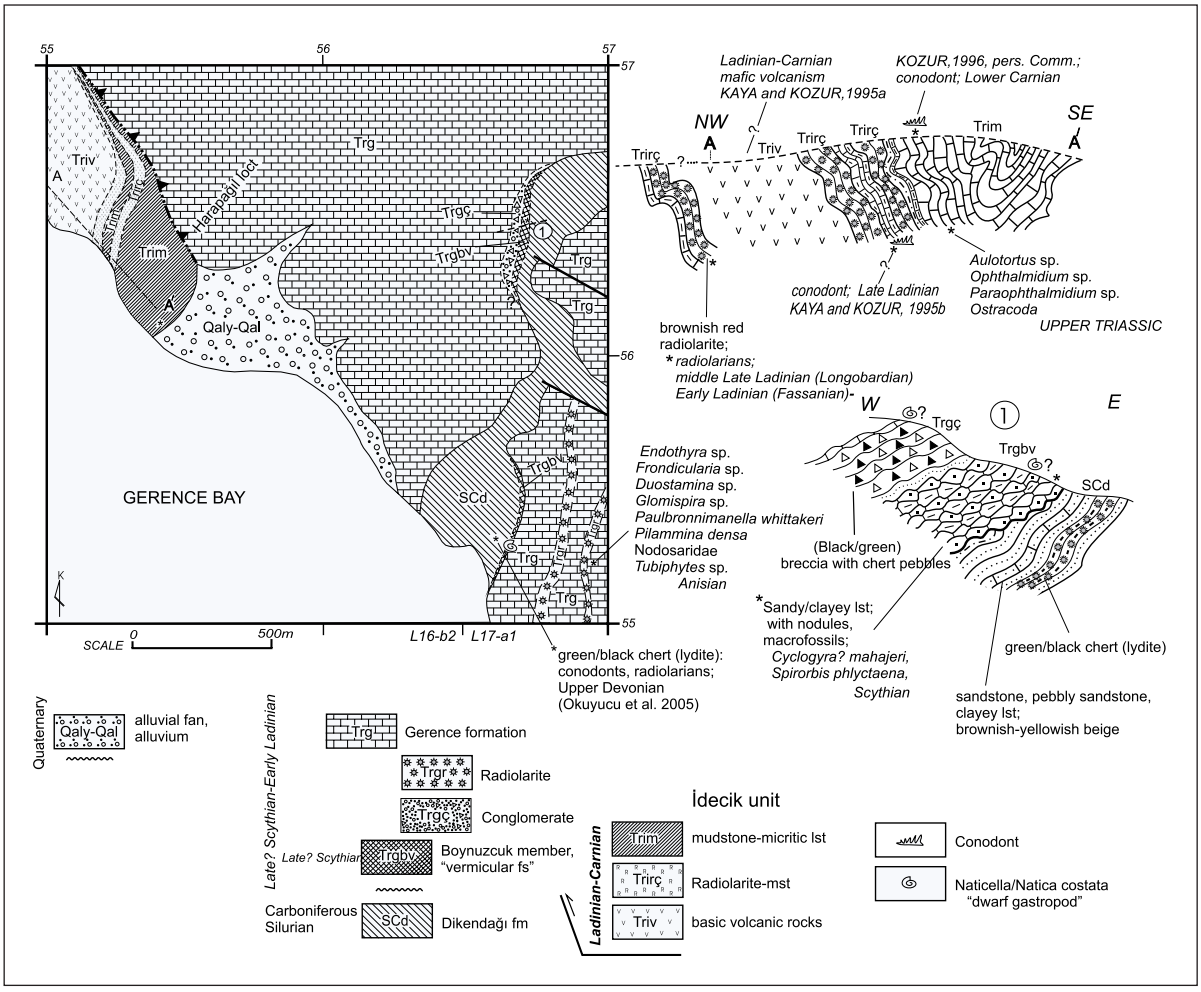


Figure 13- Geological section and map of İdecik unit at Harapağıl locality.

No fossils were determined within the matrix. But, limestone clasts and blocks include A*gerina*? sp., *Calcitornella*? sp., *Campbelliella* cf. *striata, Cayeuxia* sp., *Cladocoropsis mirabilis, Clypeina*? sp., *Diplopora*? sp., *Endothyra* sp., *Frondicularia* sp., *Glomospira*? sp., *Lituosepta* sp., *Meandospira*? sp., *Mesoendothyra* sp., *Mesoendothyra croatica, Ophtalmidium* sp., *Paleodacycladus mediterraneus, Radiolaria* sp., *Salpingoporella annulata, Siphonovalvulina* sp., *Teutloporella*? sp., *Thaumatoporella parvovesiculifera, Tubiphytes* sp., *Valvulina* sp., *pelecypods* (*Daonella* sp., *Halobia* sp.) and ammonite shell sections ranging from Triassic to Tithonian; radiolarite blocks contain *Podobursa* sp., *Praeconocaryomma* sp., *Syringocapsa* sp. ranging from Liassic to Lower Cretaceous, and *Capnuchosphaera* sp., H*indeosphaera bispinosa, Orbiculiforma* sp., *Spongostylus tortilis, Triassocampe* sp. of Carnian age (probably Julian).

İşintek et al. (2000) reported that limestone blocks of Barremian-Albian Liassic-probable Dogger carbonates (with a bauxite zone), are presented within the Izmir flysch which is included in the "Taurids Bornova Flysch Zone".

The unit is generally accepted as Late Cretaceous. However, younger ages such as "Upper Maastrichtian-Paleocene" by Konuk (1977), "end of Cretaceous-Paleocene" by Yağmurlu (1980), "Eocene" by Düzbastılar (1980), "Paleocene-Eocene" by Başarır and Konuk (1981) and by Başarır (1989), Danian/Lower Paleocene by Özer and İrtem (1982), "Late Cretaceous-Paleocene" by Erdoğan (1985), Campanian-Paleocene (with "Belkahve formation" content) by Akdeniz et al. (1986), "Campanian-Danian" by Erdoğan (1990 *a,b*), and "Late Cretaceous-Early Paleocene" by Kaya and Rezsü (2000) have been proposed. With respect to this view and obtained data, Campanian-Early Tertiary (Danian?) age has been adopted for the unit in this study.

İzmir flysch were deposited on an unstable basin/slope environment.

Yeniliman serpentinite (Kys)

The unit includes green to brownish green serpentinites and cover an area of about 2 km², just to the south of Yeniliman Village (K16-c2). The unit rests on Ordovician Küçükbahçe formation by a tectonic contact. It is unconformably overlain by Early Miocene "Salman formation" composed of conglomerates, sandstones and mudstones (Aras et al. 1999). Erdoğan (1990 *b*) reports a serpentinite block included in Maastrichtian-Danian Bornova complex too.

DISCUSSION, CONCLUSION AND PROPOSALS

1/25.000 scale geological maps of the peninsula were completed by means of this study and 1/100.000 scale geological maps were prepared by revision and compilation of the previous works.

Paleozoic deposits are mapped by differentiating into three distinct formations.

Some rock types which accepted earlier as Paleozoic/Lower Triassic, are shown that they are included in İzmir flysch of Late Cretaceous-Early Tertiary (Danian?) and it is determined that these rocks show a large extension on Karaburun Peninsula.

It is understood that Scythian is common in the study area and can be separated into sedimentary facies rather than "vermicular facies" in several meters thick.

Gerence formation extending from north to south in the peninsula has a facies change from clastics dominated to turbiditic carbonates.

Allochthonous (Late?) Permian on the peninsula was firstly proved with fossils.

Dogger, may be interpreted by basing on rock type/facies similarities with those of West Taurides. However, it is reported that there is a stratigraphic break between Liassic and Malm (Kimmeridgian) by İşintek (2002).

It was also shown that the Anisian olistostromal facies is common in the studied area.

The basic volcanism identified as Triassic-Anisian by Erdoğan et al. (1990) have been considered as younger (like Konuk, 1979; Kozur, 1995, 1998; Kozur and Kaya, 1995; Kaya and Rezsü, 2000 and Çakmakoğlu and Bilgin, 2003) according to new fossil findings. Radiolarian, conodont and other fossils of the İdecik unit and *Galeanella* sp. (Konuk 1979) (exampled in this study) point to the Norian-Rhaetian range of the structural constituents. While the Gerence formation of Anisian points to a deep marine environment, Ladinian and later reveals shallow marine conditions. However the environment of the basic volcanic rocks is controversial like Idecik unit, Carnian has a deep, but Norian-Rhaetian has a shallow marine conditions.

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