

CONTRIBUTION TO THE STRATIGRAPHY OF THE MIDDLE DEVONIAN IN THE SURROUNDINGS OF ADAPAZARI, NORTHWEST TURKEY

Orhan KAYA* and Rudolf BIRENHEIDE**

ABSTRACT.— The basal part (Alabalık member, new name) of the Middle Devonian limestone unit (Yılanlı formation) exposed in the surroundings of Adapazarı contains a well preserved prolific fauna of rugosa and tabulata (corals). The majority of the faunal elements is conspecific or comparable with such species which have been recorded mainly in the Middle Eifelian of Eurasia and North Africa. Thus the Alabalık member is very probably of the same age. The following species identified by Birenheide are new : *Xystriphyllum kayai* n. sp., *Dohmophyllum bulbosum* n. sp., *Favosites dorotheae* n. sp., *Mariusulites osmanicus* n. sp., *Mesolites interruptus* n. sp. and *Heliolites usiaeminoris* n. sp.

INTRODUCTION

In northwestern Turkey the Lower and Middle Devonian are the oldest well-known stratigraphic units with respect to their prolific fauna (Fig. 1).

In Istanbul Penck (1919) and Paeckelmann (1925, 1938) established the present outlines of the Devonian stratigraphy, and important contributions then came from numerous authors. An alternative stratigraphic classification of the Lower and Middle Devonian rocks

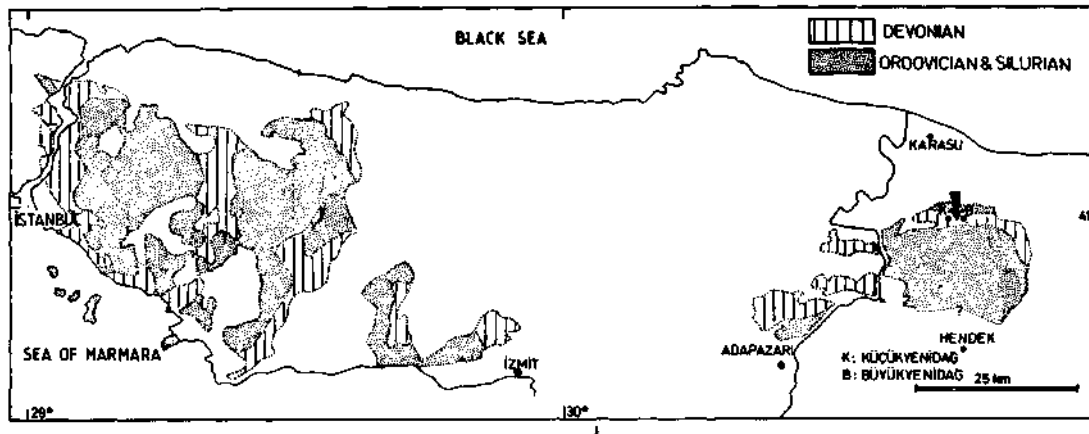


Fig. 1 — Generalized geographical distribution of Ordovician - Silurian and Devonian rocks of the İstanbul and Adapazarı areas : modified from the geological map of Turkey, 1:500,000. Black arrow = position of the road cut between K = Küçük yenidağ and B = Büyük yenidağ (G25 -a2, 05.72 : 38.78).

was proposed by Kaya (1973) on the basis of faunal descriptions given by Sayar (1962), Haas (1968), Kullmann (1973), Gandl (1973) and Carls (1973). This constituted a basis for the generalized stratigraphic succession of the Paleozoic of Adapazarı (Fig.2).

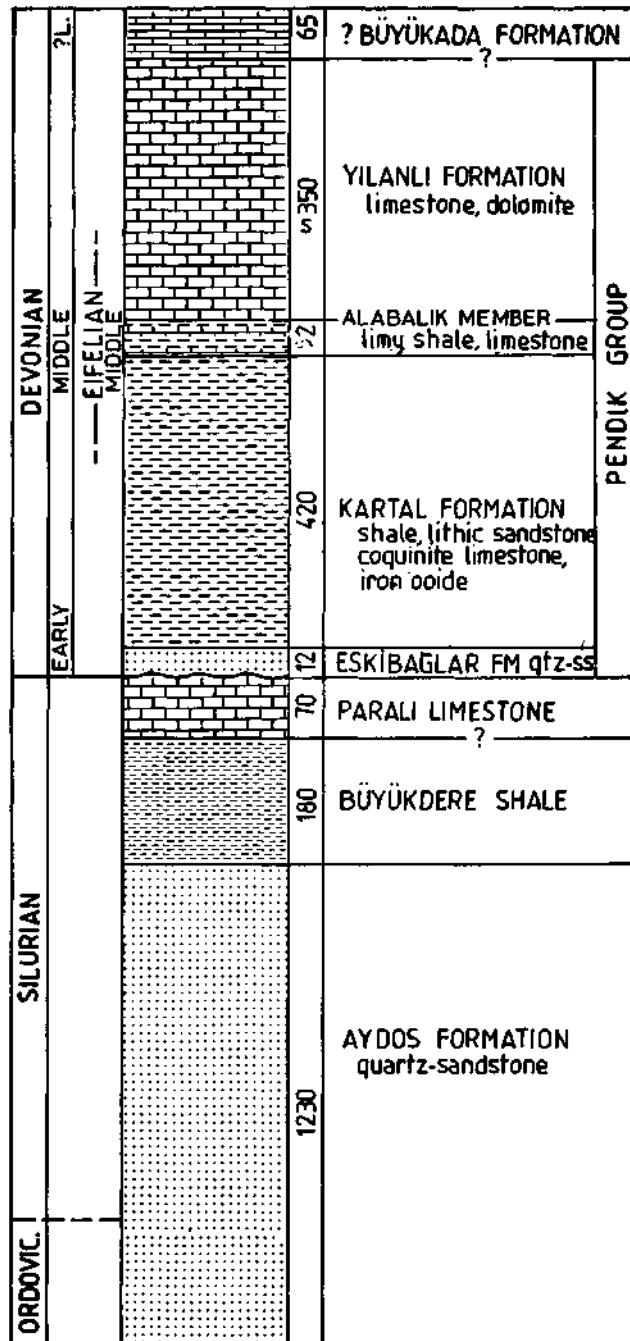


Fig. 2 — Generalized succession of the Paleozoic rocks in the Küçükyenidağ - Büyükyenidağ study area to the east of Adapazarı.

Outside Istanbul the Devonian rocks have attracted less attention. In the study and contiguous areas reconnaissance surveys of the Devonian have been made by Kleinsorge and Wijkerslooth (1940), Baykal (1955) and Türkünal (1957). Kipman (1974) proposed a stratigraphic succession for the study area, which is widely modified in the present paper.

Over extensive areas in northwestern Turkey the

the road cuttings. The stratigraphical position of the coral-bearing beds within the Alabalik member of the Yılanlı formation is presented on the column section of Fig.4.

The coral fauna given herein by Birenheide was collected by Kaya during recent years. The thin sections were prepared and are stored in the Geological Depart-

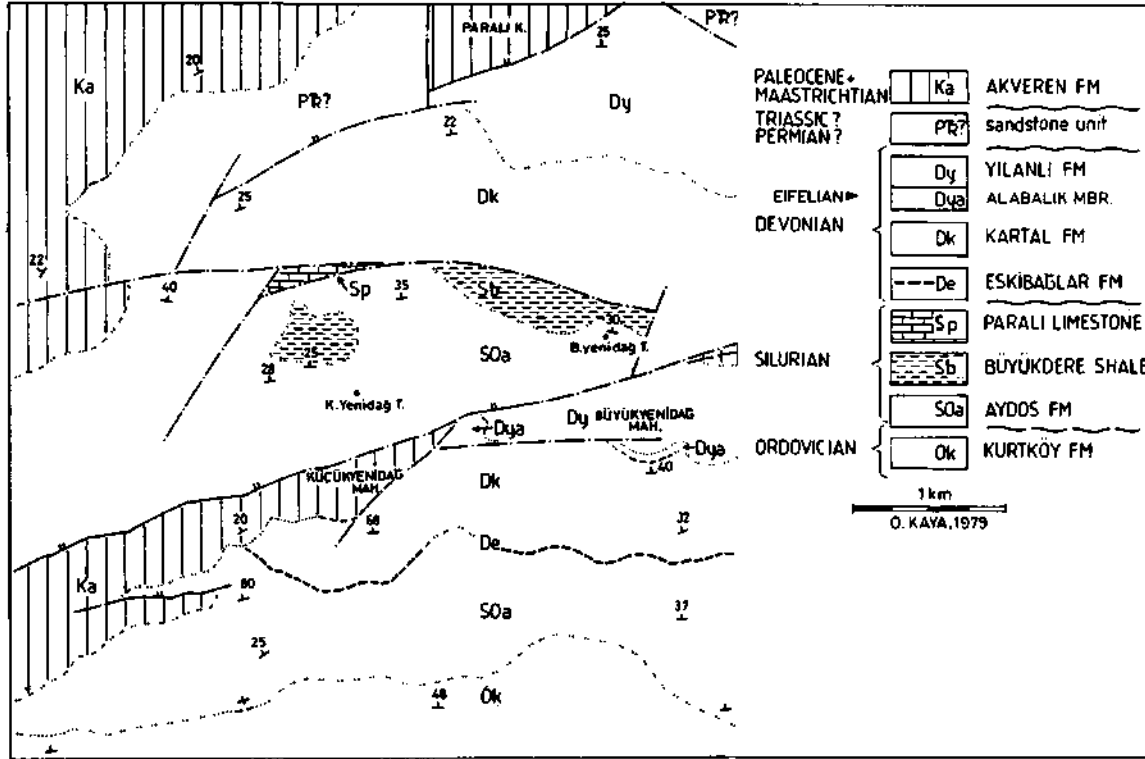


Fig. 3 — Geological map of the study area.

Devonian comprises primarily an Early to Middle Devonian mudrock sequence and a Middle Devonian carbonate sequence. However, both sequences show strong lateral changes in lithology and stratigraphic relations. The thick and pervasively dolomitized carbonate sequence of the western Pontides (Saner et al., 1980) has its westernmost exposure in the study area. The basal part of the carbonate sequence, overlying the primarily Early Devonian mudrock, contains a coral fauna which may serve as a satisfactory time marker for the boundary between the mudrock and overlying carbonate sequences.

The coral-bearing beds are exposed between Küçükyenidağ and Büyükyenidağ villages (Fig. 1), at

ment of the Senckenberg Institute, Frankfurt am Main (SMF — numbers). Detailed descriptions of the new species are in preparation.

LITHOSTRATIGRAPHY

Eskibağlar formation

The name Eskibağlar was used by Kaya (1973, p. 9) for the lower member of the Gedinnian İstinye limestone mainly composed of white quartz - sandstone rocks. The reference section is exposed in İstanbul.

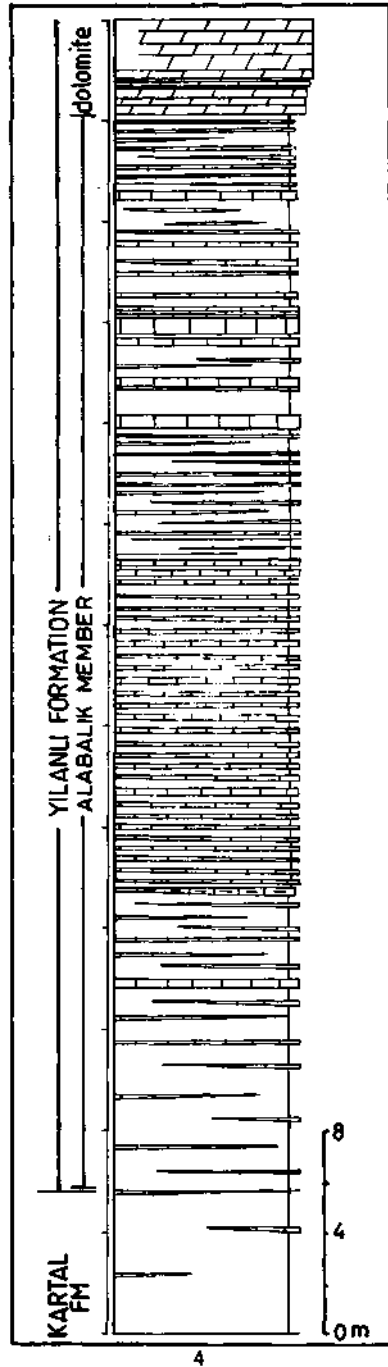


Fig.4 — Type section of the Alabalık member at the base of the Yılanlı formation. The coral - bearing beds are situated within the middle part of the sequence.

The Eskibağlar is a diachronous unit occurring beneath the Kartal formation from the study area further westward up to the east of Istanbul (Kaya, in prep.). Thus, -the rank of this unit is here elevated to a formation. In the study area the Eskibağlar formation consists uniformly of white, massive and homogeneous, recrystallized quartz arenite and fine - grained quartz conglomerate. The Eskibağlar formation rests unconformably on the Silurian rocks.

Kartal formation

The name Kartal formation was designated by Kaya (1973, p. 12) for the thick sequence of grey, variably calcareous mudrocks with intercalations of thin - bedded coquina limestones and lithic sandstones. In Istanbul, at its type locality, it corresponds to the lower clastic part of the old Lower Devonian classification (Paeckelmann, 1938). In the study area it replaces the Bıçkı formation of Kipman (1974, p. 17) and parts of the underlying Yayla and of the overlying Kabalak formations.

The mudrock consists of variably yellowish-grey weathering, thickly stacked illitic mudshale and clayshale. Abundant intercalations of lithic and quartzitic sandstone occur in the lower part. The coquina limestone interlayers are present abundantly in the upper parts of the formation. Sedimentary iron ore layers, up to 6m thick, occur about 60m below the top of the formation (Kipman 1974, p.190).

In the study area the Kartal formation is only sparsely fossiliferous. Because it is gradationally overlain by the coral - bearing beds of the Yılanlı formation, the object of this study, an upper age limit of Early Eifelian is suggested for the Kartal formation.

Yılanlı formation

The name Yılanlı formation was applied by Saner et al. (1980, p.113) for the sequence consisting of grey limestone, dolomite and limy mudrocks, being widely exposed in the western Pontides. It is partly the lithic equivalent of Kaya's (1973, p.14) Kozyatağı limestone and the time equivalent of the limestones of the Büyükada formation in İstanbul.

Table 1— List of the coral species (left) and related or same species described elsewhere (middle), with reference to their stratigraphical ranges (right)

<i>Coral species of Adapazari</i>	<i>Same or similar species recorded elsewhere</i>	<i>Stratigraphical range of compared species</i>
<i>Cyathophyllum (C.) spongiosum</i> (Schulz,1883)	<i>Cyathophyllum (C.) spongiosum</i>	Middle Eifelian (abundant) to Early Givetian (rare)
<i>Spongophyllum sedgwicki</i> Mine - Edwards & Haime,1851	<i>Spongophyllum sedgwicki</i>	Late Eifelian to Givetian (rare)
<i>Xystriphyllum kayai</i> Birenheide n. sp.	<i>Xystriphyllum glinskii</i>	Middle Eifelian (Junkerberg Fm.)
<i>Dohmophyllum bulbosum</i> Birenheide n. sp.	<i>Dohmophyllum helianthoides</i>	Early Eifelian (rare), Middle Eifelian (abundant), Early Givetian
<i>Acanthophyllum cf. filosum</i> (Wedekind,1923).	<i>Acanthophyllum filosum</i>	Early to Middle Eifelian (rare spec., Nohn to Ahrdorf Fm.)
<i>Acanthophyllum heterophyllum</i> (Mine - Edwards & Haime,1851)	<i>Acanthophyllum heterophyllum</i>	Eifelian (abundant) to Early Givetian (very rare)
<i>Favosites dorotheae</i> Birenheide n. sp.	<i>Favosites regularissimus</i>	Late Emsian (rare) to (Early) Eifelian (? abundant)
<i>Favosites aff. styriacus</i> Penecke,1984	<i>Favosites styriacus</i>	Emsian (? abundant)
<i>Favosites cf. saginatus</i> LeCompte,1939	<i>Favosites saginatus</i>	Middle to Late Eifelian (abundant)
<i>Mariusilites osmanicus</i> Birenheide n. sp.	<i>Mariusilites elegans</i> , e.p. <i>M. germanicus</i>	Eifelian Eifelian, Ahrdorf Fm.
<i>Caliapora cf. venusta</i> Janet,1972	<i>Caliapora venusta</i>	Givetian
<i>Mesolites interruptus</i> Birenheide n. sp.	<i>Mesolites multiperforatus</i>	Eifelian
<i>Alveolites straeleni</i> LeCompte,1939	<i>Alveolites straeleni</i>	Early to Middle Eifelian (abundant), Late Eifelian (rare)
<i>Squameoalveolites sp.</i> , aff. <i>fornicatus</i> (Schlüter,1889)	<i>Squameoalveolites fornicatus</i>	Eifelian (abundant in Middle Eifelian Junkerberg Fm.)
<i>Heliolites asiaeminoris</i> Birenheide n. sp.	<i>Heliolites barrandei</i> ; <i>H. Porosus</i> <i>lindstroemi</i> ; <i>H. vulgaris</i>	Givetian ; Late Emsian to Middle Eifelian ; Eifelian

The limestones are composed of dark gray, massively to thickly bedded medium to coarse grained skeletal — fragmental micrites and sparites. The dolomitization, which is controlled by structure, is pervasively developed in the upper part of the formation.

The Yılanlı formation rests gradationally on the Kartal formation; the Alabalık member represents the interval of the transitional beds.

On the basis of the coral fauna of the Alabalık member a lower age limit of Middle Eifelian can be suggested for the Yılanlı formation.

Alabalık member.— The name Alabalık member is here applied to the limy mudrock sequence with intercalations of limestone and small - sized coral build-ups (Fig.4) at the base of the Yılanlı formation. The type section is exposed at the geographical coordinates 05.72 : 38.78 of the topographic sheet G25-a2, at the eastern flank of the Alabalık river between Küçükyenidağ and Büyükyenidağ; villages (Fig. 2). The member was designated by Kipman (1974, p.20) as the Manastır nodular limestone member.

The limy mudrocks are dark grey and unevenly bedded. Laterally discontinuous skeletal-fragmental limestones and individual colonies or small-sized build-ups of corals occur abundantly in the middle part of the member. The limestone intercalations increase in thickness and abundance upward in the Alabalık member, grading into the main body of the Yılanlı formation.

The Alabalık member overlies gradationally the Kartal formation.

The rugose and tabulate corals indicate a predominantly Middle Eifelian age for the Alabalık member. For species and their stratigraphic range see Table 1.

STRATIGRAPHICAL CONCLUSIONS

From the compilation given in Table 1, it is immediately evident that the majority of the species

are widespread in the Middle Eifelian deposits of Eurasia and North Africa, with special relations to the Middle and West European realm. A relation to Devonian species of the Eastern Alps might at first be expected, but this does not seem to be present. This may have as its reason the poor development of Eifelian marine deposits within that realm. It is an open question as to whether only the Alabalık member represents Eifelian age within the Devonian succession of Adapazarı, or whether this geological time unit is continued in the overlying parts of the Yılanlı formation as well as in the underlying upper parts of the Kartal formation. We have some reason to assume that the greatest part of Eifelian time is represented only by the Alabalık member; this is evident by the occurrence of a small number of coral species which have their bulk in Givetian time, as *Spongophyllum sedgwicki* and *Caliapora* cf. *venusta*, or in Late Emsian to Early Eifelian time, as the *Favosites styriacus* species group.

At present we have only very little knowledge of fossils of the thick-banked Yılanlı limestones which are dolomitized throughout; compared with the similar development of the Givetian reef limestones of the Rhenish Mountains it cannot be excluded that at least their majority is of Givetian age, too.

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