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PRESENCE OF RUDIST BEARING LIMESTONE BLOCKS DERIVED FROM THE ARABIAN PLATFORM IN GEVAŞ (VAN) OPHIOLITE

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ABSTRACT. - The Gevaş ophiolite consists of ultramafic rocks, gabros, lavas, tuffs, cherts, shales, and it contains also limestone blocks. The majority of these limestone blocks are unfossiliferous. The fossiliferous limestones are observed only around İkizler and Dilmetaş villages. The sandy limestones cropping out near İkizler village have rare fossil such as rudists, gastropods, and some coral fragments. However, the limestone block of Dilmetaş village contain a rich macrofauna consisting of rudist, gastropods, lamellibranchs and corals. The rudist fauna consist of *Dictyoptychus* cf. *euphratica, Dictyoptychus* sp., *Hatayia* sp., *Hippurites syriaca, Hippurites comucopiae, Vaccinites* sp. and *Sabinia* sp. indicating a Maestrichtian age. The rudist forms are characteristic for the Arabian platform and they show a distribution in southeastern Anatolian region, Iran, Syria and Oman Peninsula. The biogeographic characteristics of the rudists suggest that the fossiliferous limestone blocks of Gevaş ophiolite were derived from the Maestrichtian units of the Arabian platform.

INTRODUCTION

Gevaş ophiolite association contains fossiliferous and unfossiliferous limestone blocks (Fig. 1). The fossiliferous limestones have a rich macrofauna consisting of rudists, gastropods, corals and lamellibranchs. The benthic foraminifers and red algae are rare.

In the previous studies, the faunal composition of the fossiliferous limestones has not examined in detail, and their age has been accepted as Late Cretaceous. According to the lithologic similarities, these limestone blocks were proposed as an equivalence of the Besni formation showing a wide geographic distribution in the southeastern Anatolia (Ternek, 1953; Yılmaz, 1978; Yılmaz et al., 1981).

The aim of this study is to reveal the origin of the exotic limestone blocks based on the biogeography of the rudists, and also to examine the faunal composition and the facies characteristics of the rudist bearing limestones in the Gevaş. area.

The rudist samples have been collected around Dilmetaş and İkizler villages, and a stratigraphic section has been measured at Sivertan hill (Fig. 1). In the valve sections of rudists Moore's (1969) methods are used. The carbonate rocks are named according to Dunham (1962). The textures of reefal limestones are classified according to Embry and Klovan (1971).

STRATIGRAPHY

The geology of the south of Van lake has been studied by Yılmaz et al. (1981) and four rock units have been differentiated; these are metamorphic rocks of the Bitlis massive, ophiolite association, rocks of the transition zone between the ophiolite and metamorphic rocks, and the overlying sedimentary cover (Fig. 1).

The ophiolite association shows a wide distribution in the southern part of the Van lake and consists of ultramafic serpentinites, gabros, dark green-brown-red colored lavas and tuffs, cherts and shales. This association contain also fossiliferous or unfossiliferous limestone-blocks which are observed in the southwest of Yemişlik and Dilmetaş villages, in the northeast of İkizler village, in the west of Gevaş and also in the surroundings of Aladüz village (Fig. 1).

The limestone blocks cropping out near Yemişlik village and close to the hills of Tabir and Parlük (NE of İkizler village) are recrystallized and unfossiliferous. These blocks are located within the spilites and cherts.

In the west of Gevaş, red-cherty limestones contain some ghost of the foraminifers showing diagenetic effects.

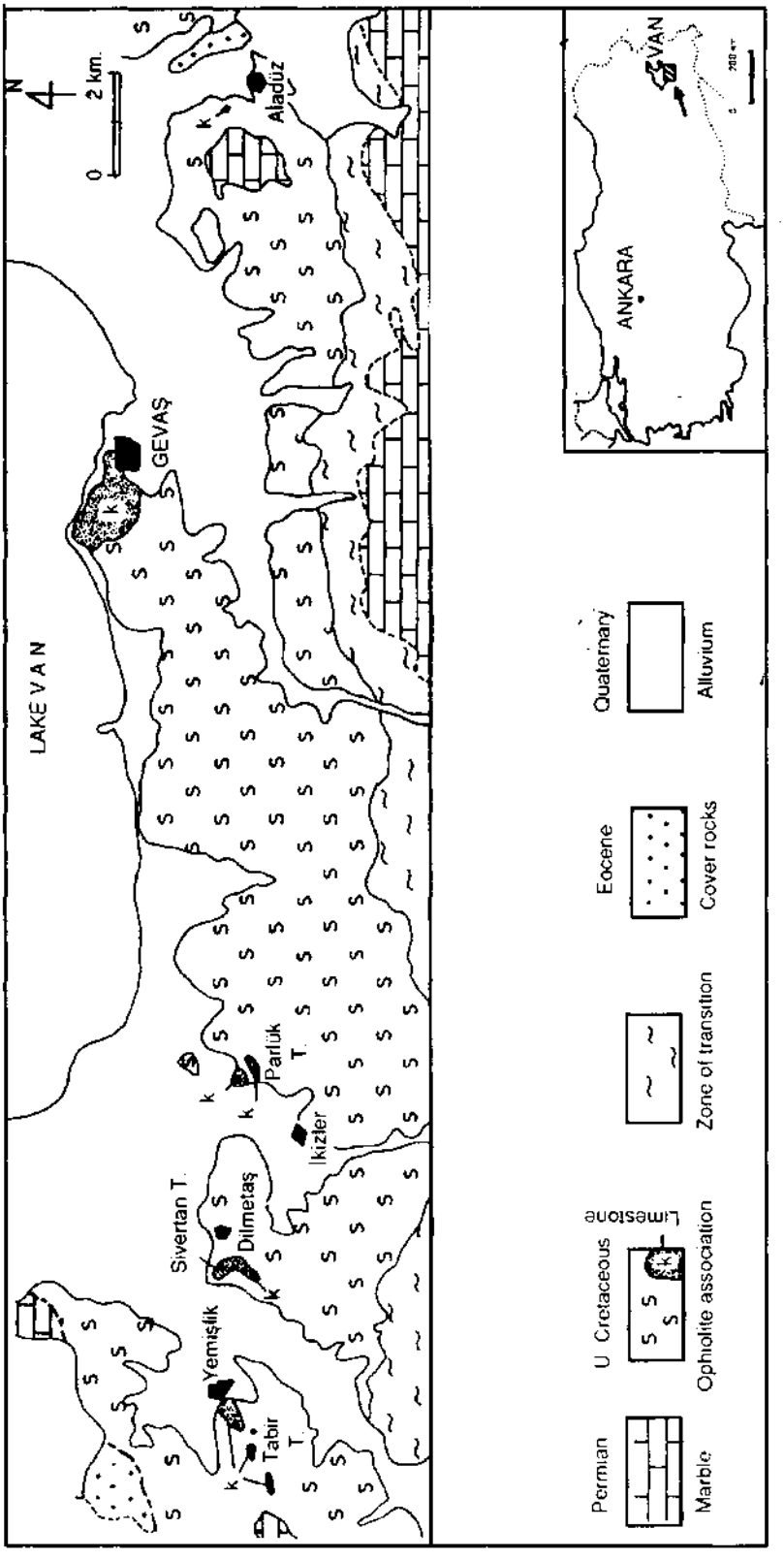

Fig. 1 - The geologic map showing the distribution of the limestone blocks within the Gevaş ophiolite (simplified from Yilmaz et al. 1981).

A small, dark-gray limestone block in also observed near Aladüz village. These limestones contain some structures resembling to the coral's septa and algae; the microfossils have not been recognized.

In the study area, the fossiliferous limestones crop out around the hills of Parlük and Sivertan (Fig. 1).

Around Parlük hill, dark-gray, massive, fossiliferous sandy limestones, sandstones and conglomerates are located over the cherts. The fossils are rare; however some gastropods, corals and hippuritid fragments are determined (Plate I, fig. 6).

In the Sivertan hill, the limestones contain abundant macrofossils and form an anticlinal structure allowing a measured stratigraphic section.

Sivertan hill section

This stratigraphic section consists of the following succession from bottom to top (Fig. 2): Grayish-green conglomerates and sandstones (5 m.) with abundant ophiolitic fragments. Grey sandy limestones (1-1.5 m.), unfossiliferous. The texture is wackestone.

Rudist bearing limestones (3 m.). The framestone biostromes constructed by the cylindrical and long (18-20 cm) rudists such as *Hippurites cornucopiae* Defrance (Plate I, fig. 1, 2), are observed. The texture of the limestones is packstone.

Grey bioclastic sandy limestones (30-35 m.) with rare rudist fragments, corals (small Cyclolites) and gastropods (long conical or short conical forms) (Plate I, fig. 10, 11, 12); actaeonellas are rare. These limestones are generally wackestones-packstones with various skeletal fragments and lithoclasts-quartz. The intense micrite envelops around the skeletal fragments and also geopetal calcites within the gastropod sections are observed.

Yellow limestones (10-12 m.) rich-in gastropods. The gastropod build-ups constructed by the actaeonellas are frequents. The sections of the actaeonellas are ellipsoidal in shape (Plate I, fig. 9). The packstones consist of mainly gastropod fragments, coral fragments, large benthonic foraminifers such as Loftusia (Plate I, fig. 7) and rare quartz.

Grey massive limestones (7-8 m.) characterizing by large rudists and consisting of packstones-wackestones with the skeletal fragments, small quartz, foraminifers *(Pseudodomia* sp., and Rotalidae), corals or algae. The micrite envelops around the skeletal fragments are observed. The bafflestone rudist build-ups are identified; however some framestones constructed by Exogyra (Plate I, fig. 8) are also exist. The rudist fauna consists of the following forms (Plate I, fig. 1 -5):

Dictyoptychus cf. *euphratica* Karacabey-Öztemür

Dictyoptychus sp.

Hatayia sp.

Hippurites syriaca Vautrin

Hippurites cornucqpiae Defrance

Vaccinites sp.

Sabinia sp.

Dictyoptychus is dominant in the rudist fauna.

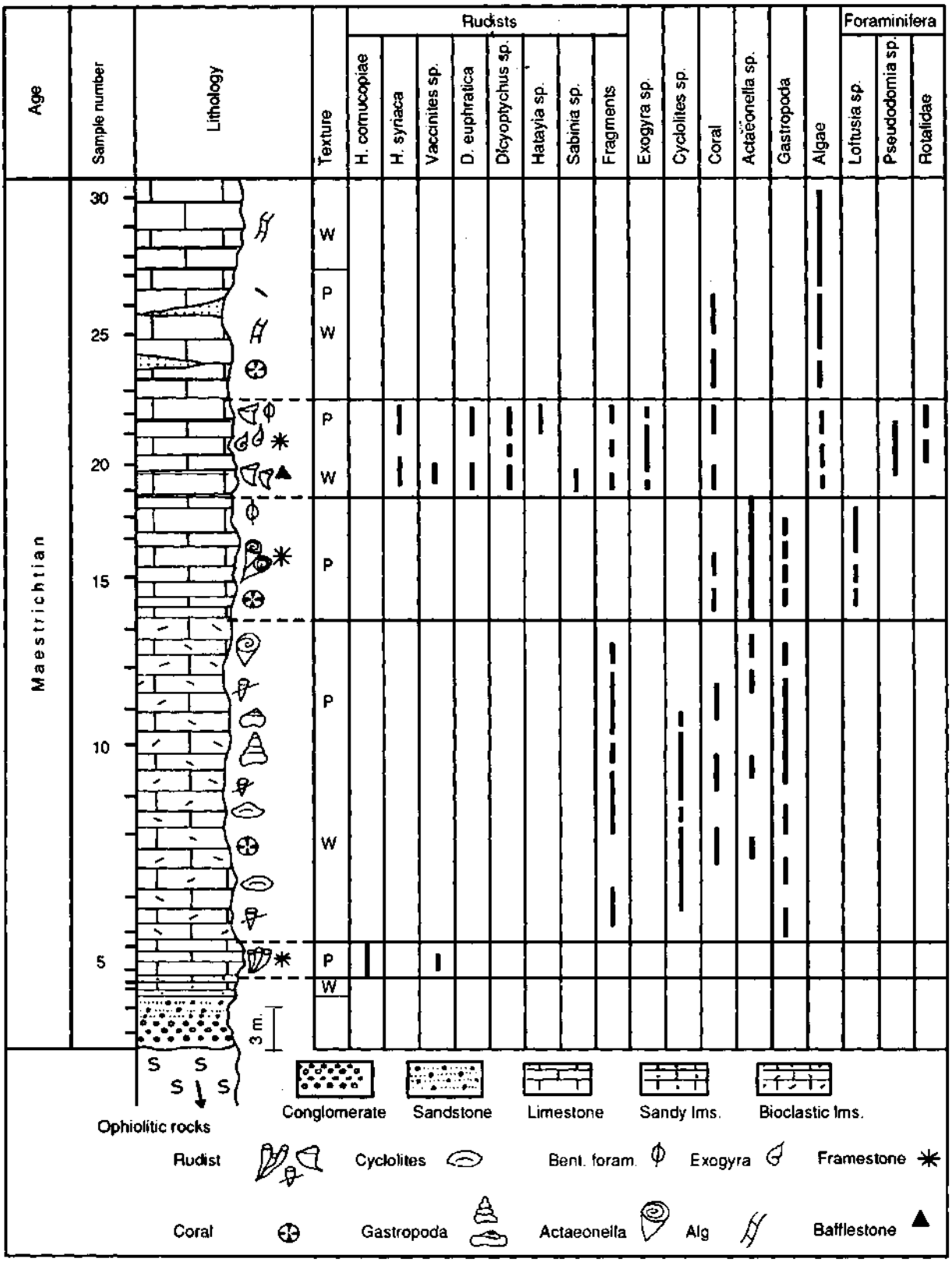

Fig. 2 - The measured stratigraphic section of the Sivertan Hill-Dilmetaş village (Gevaş). P- packstone; W- wackestone.

- Dark-grey massive limestones (10-15 m.) with locally sandstones and sandy limestones lens containing some algae or coral build-ups.

- Dark-grey massive limestones (8-10 m.) with probably algal sections. These limestones are very similar to the limestones cropping out near Aladüz village.

The rudist fauna of the Sivertan hill limestones indicates a Maestrichtian age. The foraminifers also support this age. The riches of the benthonic fossils suggest that the rudist bearing limestones are developed in the shallow-marine conditions.

GEOGRAPHIC AND STRATIGRAPHIC DISTRIBUTION OF RUDISTS

The Upper Cretaceous rudists determined from the various localities of Turkey show a wide geographic distribution in the Apulian plate (or Apulia-Anatolia) and Arabian plate. The Apulian plate has a rich rudist fauna while the Arabian platform characterizes with some rudist forms such as Vautrinia, Dictyoptychus, Hatayia, *Hippurites syriaca* and *Pironaea syriaca* (Özer, 1988 *b,* 1991).

The rudist fauna from the limestone of the Gevaş ophiolite, consists of the Arabian platform's rudist forms, showing a distribution in the Maestrichtian of the southeastern Anatolia, and also in Iran, Syria and Oman Peninsula (Fig. 3).

The genus Dictyoptychus is abundant in the Gevaş area, and it is characteristic for the southeastern Anatolia. The many species of this genus have been determined from the Maestrichtian of Kahta-Adıyaman (Karacabey-Oztemur, 1979; Özer, 1986, 1988 a and *b)* and Yayladağı-Hatay (Karacabey-Öztemur and Selçuk, 1981; Özer, 1991). The type locality of the species *Dictyoptychus euphratica* is Kahta-Adıyaman (Karacabey-Öztemür, 1979). The genus Dictyoptychus has been found together with the foraminifers indicating Maestrichtian age in Iran (Douville, 1910) and Omah Peninsula (Kühn, 1929).

The genus Hatayia is first recognized out of its type locality in the Gevaş area (Karacabey-Öztemür and Selçuk, 1981).

The species *Hippurites syriaca* has a wide distribution in the southeastern Anatolia. This species is very abundant in the Maestrichtian units of Yayladağı-Hatay and Adıyaman region (Vautrin, 1933; Dubertret, 1966; Özer, 1986, 19886, 1991).

In the rudist fauna, only the species *Hippurites cornucopiae* has a wide geographic distribution in the Mediterranean Province. This species has been determined from the Maestrichtian of the Kahta-Adıyaman, Malatya, eastern of Tuz Gölü, Haymana-Ankara, Hereke-Kocaeli Peninsula, and also Yugoslavy, Italy and Sicily (Karacabey-Öztemür, 1976; Özer, 1983, 1986, 1988 *b;* Sanchez, 1981). The species *Hippurites cornucopiae* seem to be adabtable form to the variation of ecological conditions in the Maestrichtian time. Some benthonic foraminifers associated with rudists have also the same ecological characters in the Mediterranean Province (Fleury et al., 1985; Meriç, 1985).

The biogeographic characters of the rudists determined from the Gevaş area suggest that the rudists show mainly a distribution in the Arabian platform.

DISCUSSION AND CONCLUSIONS

The limestones of the Gevaş area have been called as "rich fossiliferous" or "containing coral, lamellibranch and microfossils" in the previous studies. The first occurrence of the rudists in these limestones are established in this study, and also the macro and microfossils are recognized in detial.

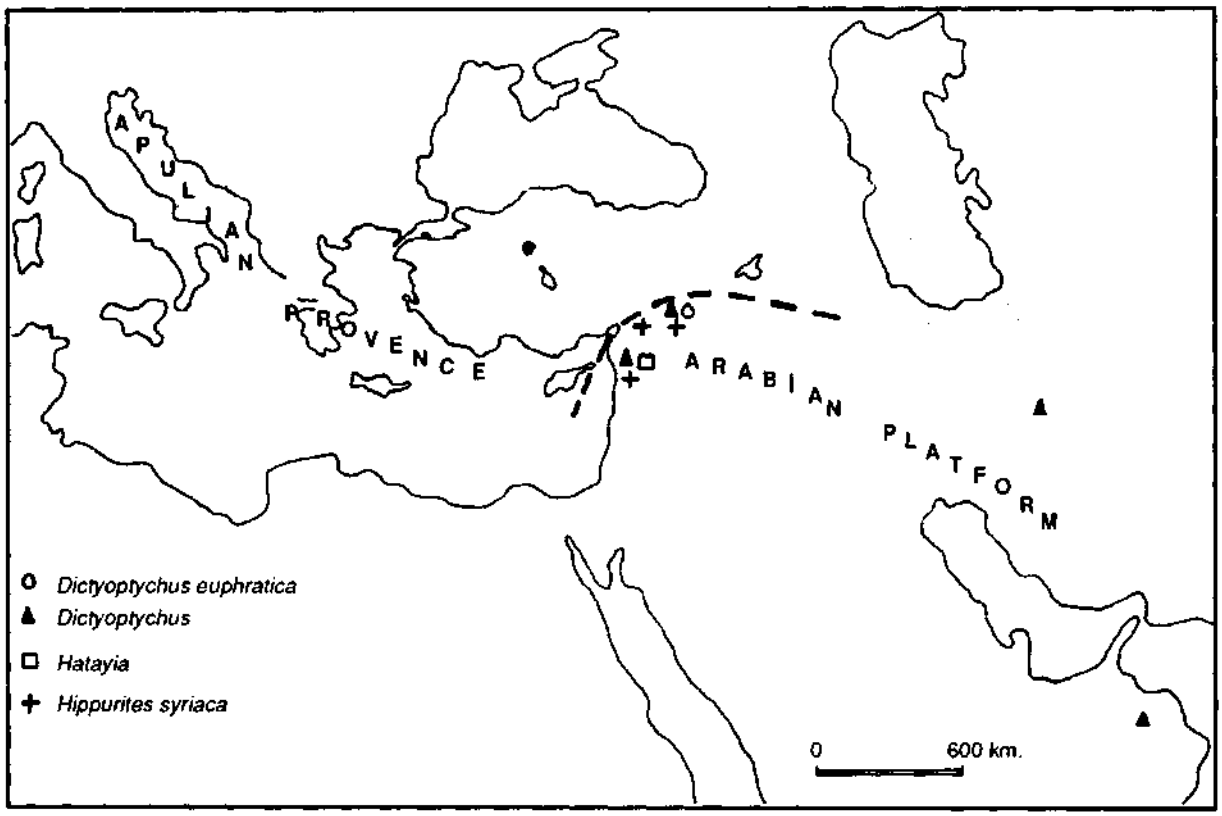

Fig. 3 - The geographic distributions of the rudists from the limestone of the Gevaş ophiolite in the Mediterranean province.

According to the geographic distributions of the rudists, it is determined that the rudist fauna consists of the Maestrichtian forms propre to the Arabian platform.

In the previous studies (Yılmaz, 1987; Yılmaz et al., 1981), the limestones cropping out within the Gevaş, ophiolite have been proposed as equivalence of the Besni formation based on the lithologic similarities. However, the studies from the various localities of the Anatolia, except the carbonate sequence of the western Taurids and Izmir surroundings, show that the late Senonian units have similar lithologic characters (Özer, 1988b). The rudist bearing late Senonian represents by the clastic sequence in the southeastern Anatolia, eastern and central Anatolia, Kocaeli Peninsula and Pontid belt. In these regions, the late Senonian sequence consists of the following units, from bottom to top: red elastics, yellowisch-grey sandstones-sandy limestones rich-in benthonic fossils, and pelagic shales-mudstones. The fossiliferous rocks of the Gevaş, ophiolite show a very close lithologic characters with those of the other regions of Anatolia. So, lithologic features can not be accepte as the favorable criteria for the correlation of the fossiliferous limestones of the Gevaş. area.

Instead of the petrographic correlations proposed by the other studies, it is revealed an approach based on the rudist biogeography in this study which the fossiliferous limestone blocks cropping out within the Gevaş. ophiolite have been derived from the units of the Arabian platform.

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PLATE

PLATE-I

Fig. 1,2- *Hippurites cornucopias* Defrance.
Dilmetas, village, Sivertan Hill, Gevaş-Van Maestrichtian.
1- Longitudinal view of the four individus (a, b, c, D), X 0.8
2- Transversal section of the lower valve, S and E siphonal pillars, X1.7.

Fig. 3- *Hippurites syriaca* Vautrin.
Dilmetaş village, Sivertan Hill, Gevaş-Van, Maestrichtian, X 0.8
External view of the lower valve. Siphonal pillar E represents by a groove (o) on the surface of the valve.

Fig. 4- *Dictyoptychus* cf. *euphratica* Karacabey-Öztemür
Dilmetaş village, Sivertan Hill, Gevaş-Van, Maestrichtian, X 0,9.
External view of the lower valve.

Fig. 5- *Hatayia* sp.
Dilmetaş village, Sivertan Hill, Gevaş,-Van, Maestrichtian, X 1.
Transversal section of the upper valve. Note the radial canals.

Fig. 6- Section of the Hippuritidae (k)
İkizler village, Parlük Hill, Gevaş-Van. Maestrichtian, X 1.

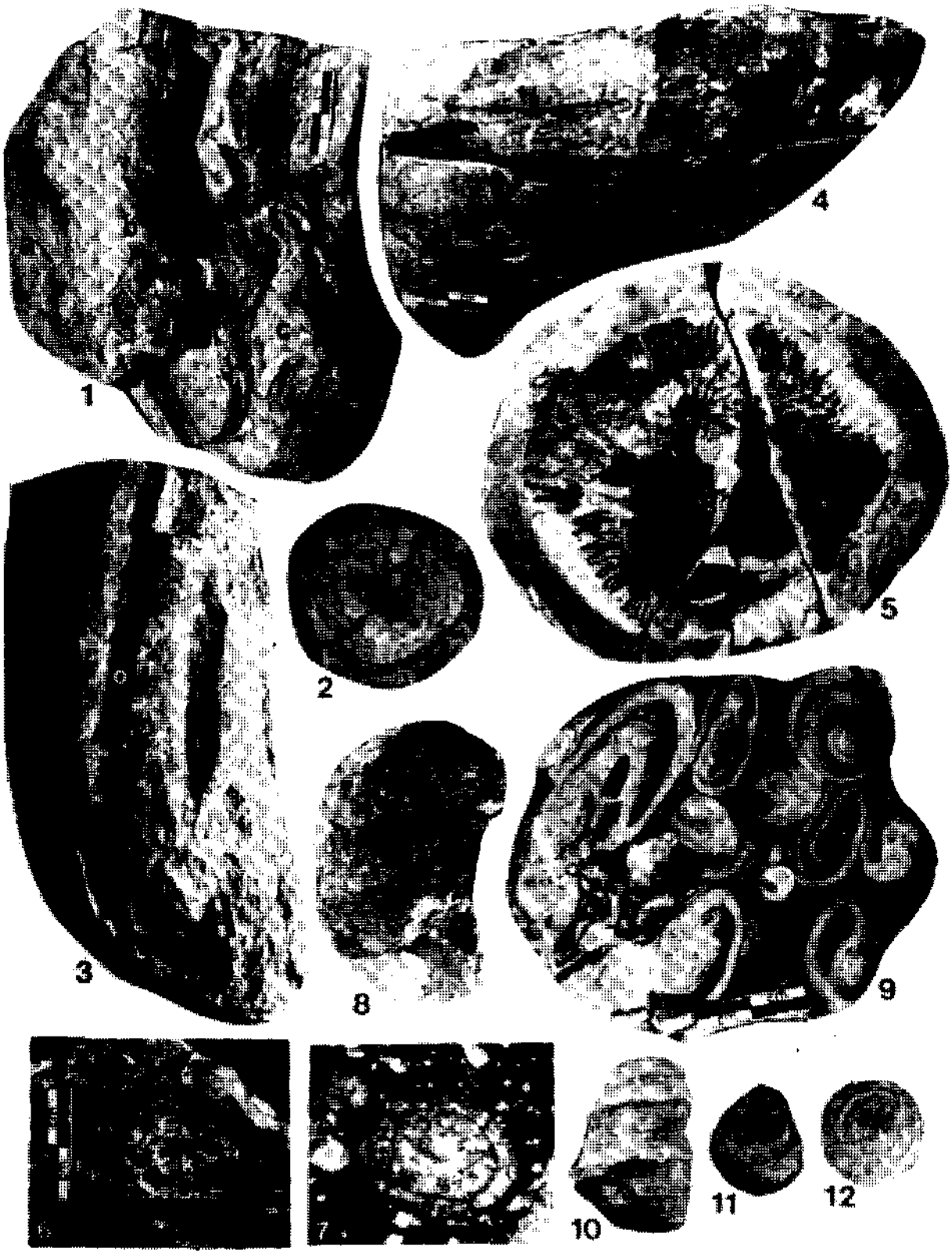
Fig. 7- *Loftusia* sp.
Dilmetaş village, Sivertan Hill, Gevaş-Van, Maestrichtian, X 25, Sample No: SV 15.

Fig. 8- *Exogyra* sp.
Dilmetaş village, Sivertan Hill, Gevaş-Van, Maestrichtian, X 1.
Note the ellipsoidal sections

Fig. 9- Sections of gastropods.
Dilmetaş village, Sivertan Hill, Gevaş-Van, Maestrichtian, X 1
Note the ellipsoidal sections.

Fig. 10, 11- External view of the gastropods.
Dilmetaş village, Sivertan Hill, Gevaş,-Van, Maestrichtian, X 1

Fig. 12- *Cyclolites* sp.
Dilmetaş village, Sivertan Hill, Gevaş-Van, Maestrichtian, X 1
View from the bottom of the valve.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