UPPER CRETACEOUS PLANKTONIC FORAMINIFERAL BIOSTRATIGRAPHY OF THE BEY DAĞLARI AUTOCHTHON IN THE KORKUTELI AREA, WESTERN TAURIDES, TURKEY

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ABSTRACT

The Upper Cretaceous sequence of the Korkuteli area (Western Taurides) comprises two formations. The Bey Dağları Formation lies at the base and can be divided into two parts. A 600-m-thick neritic lower part is capped with thin, massive, hemipelagic limestones. The Akdağ Formation conformably overlies different stratigraphic levels of the Bey Dağları Formation along a prominent erosional surface and consists of thin-bedded, cherty, pelagic, clayey limestones. Paleogene marls form the base of the Tertiary sequence and conformably overlie different stratigraphic levels of the Upper Cretaceous succession. This study identifies from thin sections and analyzes the Late Cretaceous planktonic foraminifera.

Identification of forty-five species belonging to the genera Contusoturricula, Dicarinella, Gansserina, Globotruncanina, Globotruncanella, Globotruncanita, Marginotruncana and Radotruncana has led to the recognition of five biostratigraphic zones, in ascending order: Dicarinella concavata Interval Zone (IZ), Dicarinella asymetrica Total Range Zone (TRZ), Radotruncana calcarata TRZ, Globotruncanina falsostuarti Partial Range Zone (PRZ) and Gansserina gansseri IZ, from the Senonian succession of the Bey Dağları autochthon. The Dicarinella concavata IZ and Dicarinella asymetrica TRZ have been identified from the massive hemipelagic limestones of the Bey Dağları Formation and indicate a Coniacian-Santonian age. The Radotruncana calcarata TRZ, Globotruncanina falsostuarti PRZ and Gansserina gansseri IZ have been recognized from the pelagic limestones of the Akdağ Formation and suggest a late Campanian-earliest Maastrichtian age.

The identified planktonic foraminiferal biozones indicate that the Bey Dağları carbonate platform drowned after the late Turonian; the Upper Cretaceous (Coniacian-earliest Maastrichtian) pelagic succession includes two stratigraphic gaps in the Korkuteli area corresponding to lower-middle Campanian and upper Maastrichtian. Slight drowning of the platform after the late Turonian may have been related to the regional extension which affected peri-Mediterranean alpine belts. The regional hiatuses in the pelagic succession are also ascribed to the tectonic events, as the Late Cretaceous is a time of great tectonic activity in this critical area of Tethys. Eustatic sea-level changes may have had a secondary effect on the Upper Cretaceous carbonate succession of the Bey Dağları autochthon.

INTRODUCTION

The great abundance and wide distribution of planktonic foraminifera in marine sediments and their rapid evolution during Mesozoic time make them a powerful biostratigraphic tool for global biostratigraphy and precise regional and interregional correlation. They are especially useful when intercalibrated with other important groups like nannoplankton and ammonites.

The biostratigraphic importance of Cretaceous planktonic foraminifera became more widely realized after the papers of Viennot (1930) and Thalmann (1934; Caron, 1985), and there was an enormous increase in the recognition of their importance during the 1940’s and 1950’s (Pessagno, 1962). Middle and Late Cretaceous biostratigraphic zonations were revised and reconciled by the European Working Group on Cretaceous Planktonic Foraminifera (Robaszynski & Caron, coordinators, 1979; Robaszynski and others, 1984) and by Caron (1985) to reduce the complexity caused by the multitude of previously established taxa. Robaszynski & Caron (1995) and Robaszynski (coordinator, 1998) calibrated the planktonic foraminiferal biozones with the time scale of Gradstein and others (1994).


Many studies over nearly four decades have been carried out on the Bey Dağları autochthon. Although pelagic limestones have a wide geographic distribution throughout the Bey Dağları autochthon, the planktonic foraminiferal biostratigraphy of the Upper Cretaceous pelagic limestones has been the subject of only a few detailed studies, including Farinacci and Yeniay (1986), Özkan and Köylüoğlu (1988), Sarı (1999) and Sarı and Özer (2002). These studies have shown that the Upper Cretaceous pelagic sequence is characterized by important sedimentary gaps.

The lithostratigraphic and microfacies characteristics of the neritic and pelagic limestones of the Bey Dağları and Akdağ formations were documented in detail elsewhere (Sarı, 1999; Sarı and Özer, 2001; Sarı and Özer, 2002; Sarı * Email: bilal.sari@deu.edu.tr
and others, 2004). The purpose of this paper is to present the biostratigraphic zonation of the planktonic foraminifera examined in thin section from the Late Cretaceous (Coniacian-early Maastrichtian) of the Bey Dağları autochthonous unit.

Documentation of the planktonic foraminiferal biozonation is important because the history of pelagic sedimentation in the Late Cretaceous provides a critical record of platform drowning, tectonic events, fluctuations in sea level and erosional events. Four stratigraphic sections were studied after detailed geological mapping to establish the planktonic foraminiferal biostratigraphy of the Korkuteli area, which corresponds to the middle part of the Bey Dağları autochthon (Figs. 1, 2).

MATERIALS AND METHODS

One hundred sixty-eight closely spaced samples were collected from four stratigraphic sections, which were measured from southwest of Korkuteli (Fig. 2). The samples were taken from the massive hemipelagic lime-stones of the Bey Dağları Formation and thin- to medium-bedded, clayey, pelagic limestones of the Akdağ Formation. Because it was very difficult to disaggregate the limestones and process them with normal washing, thin sections were prepared to analyze the planktonic foraminifera.

The position of apertures and the presence of supplementary and accessory structures that are used to distinguish genera are not identifiable in thin section (Caron, 1985). However, most of the diagnostic criteria, including the size and shape of the test; thickness of the wall; size, shape, number and arrangement of chambers; form and position of the aperture; and ornamentation such as ridges, spines, and position and number of peripheral thickenings or keels, can be recognized in axial and subaxial sections (passing through or parallel to the axis of coiling; Sliter, 1989; Fig. 3).

A large number of specimens was encountered in the thin sections, but most of them were of no use for identification because of partial or oblique cuts through the tests. Hence, axially oriented forms were picked to identify most taxa with a high degree of confidence. The atlases of the European Working Group on Cretaceous Planktonic Foraminifera by Robaszynski and Caron (coordinators, 1979) and Robaszynski and others (1984), and the studies of Caron (1985) and Premoli Silva and Sliter (1994) are the bases of the identifications in this study. In addition, Postuma (1971), Wonders (1979), Fleury (1980), Ózkan and Köylüoğlu (1988), Sliter (1989), Robaszynski and others (2000) and Premoli Silva and Verga (2004) are useful references as they include illustrations of thin sections of planktonic foraminifera.

REGIONAL GEOLOGICAL SETTING

The Bey Dağları autochthon, which is approximately 150 km long, is oriented NE-SW and extends from Kaş to Isparta (Fig. 1). The autochthon represents a segment of a Mesozoic Tethyan platform on which carbonate accumulation persisted from the Triassic to the early Miocene. This segment was overthrust by the Antalya nappes in the east and by the Lycian nappes in the northwest, and is partially exposed in the Göcek window (Özgül, 1976; Poisson, 1977; Farinacci and Köylüoğlu, 1982; Naz and others, 1992; Robertson, 1993; Fig. 1). During the Mesozoic, the autochthonous unit was part of a larger crustal fragment of the African paleomargin which can be traced in the Taurides and Zagrides to the east, and the Hellenides, Dinarides and Apennines to the west (Şengör and Yılmaz, 1981; Farinacci and Köylüoğlu, 1982; Poisson and others, 1983; Özgül, 1984; Robertson and Dixon, 1984; Robertson and Woodcock, 1984; Farinacci and Yeniyi, 1986; Robertson, 1993, 1998; Robertson and others, 2003).

The Bey Dağları autochthon was affected by different tectonic regimes during the Late Cretaceous, a time of intense tectonic movements in this critical area of the eastern Mediterranean. Late Cretaceous tectonic activities are thought to be responsible for the drowning of carbonate platforms, opening of small oceanic basins and collision of different tectonic units. Many studies have shown that the Upper Cretaceous sequences are characterized by breaks in deposition and important facies variations in both neritic
Figure 2. Geological map of the Korkuteli area.

Figure 3. Principal sections through a planktonic foraminiferal test. a) Axial section: section passing through the axis of coiling. b) Subaxial section: section passing parallel to the axis of coiling but not passing through the proloculus. c) Transverse section: section passing perpendicular to the axis of coiling. d) Oblique section: section passing neither parallel nor perpendicular to the axis of coiling.

LITHOSTRATIGRAPHY

The Upper Cretaceous sequence of the Bey Dağları autochthon comprises two formations in the Korkuteli area. The Cenomanian-Santonian Bey Dağları Formation lies at the base and is conformably overlain along an erosional surface by the upper Campanian-lower Maastrichtian Akdağ Formation. Paleogene pelagic marls form the base of the Tertiary sequence and conformably overlie different stratigraphic levels of the two Upper Cretaceous formations.

Bey Dağları Formation can be divided into two parts, as follows. Neritic limestones of Cenomanian-late Turonian age are approximately 600 m thick and constitute most of the sequence. The uppermost part of the neritic limestones is characterized by a 20-m-thick rudistid level, which is dominated by the rudist bivalve Vaccinites praegiganteus (Toucas, 1904). A late Turonian age (mean age: 89.11–90.10) was indicated by $^{87}$Sr/$^{86}$Sr values of well-preserved, low-Mg calcite from the shells of *V. praegiganteus* (Sarı and others, 2004). The neritic limestones are capped with massive hemipelagic limestones, which form the upper part of the formation. The hemipelagic limestones are massive, cream-colored and fractured, and contain sparse planktonic foraminifera and abundant spheroidals. The neritic and hemipelagic limestones are similar in appearance and cannot be differentiated from each other in the field. The maximum thickness of the hemipelagic level was measured from the northwest of Kargaliköy as about 14 m (Fig. 4).

The limestones, in which the planktonic foraminifera first appear, are arguably considered the transitional zone between the neritic and hemipelagic facies. Rudist fragments, echinoids, bryozoans, rare bivalves and abundant spheroidals accompany the foraminiferal assemblage, which indicates a late Turonian-Santonian age according to the zonal scheme of Robaszynski and Caron (1995). As the hemipelagic limestones overlie the late Turonian rudistid neritic limestones, the oldest age assignable to the hemipelagic limestones is Coniacian. Two planktonic foraminiferal biozones have been established for the hemipelagic limestones: the *Dicarinella concavata Interval Zone and Dicarinella asymetrica Total Range Zone* (Fig. 4).

The upper Campanian-lower Maastrichtian Akdağ Formation disconformably overlies different stratigraphic levels of the Bey Dağları Formation along a prominent surface (? hardground). The surface is characterized by iron oxidation, silicification and bioturbation, indicative of a later period of low rates of sedimentation due to relative starvation (Rosales and others, 1994). The Akdağ Formation is composed of thin- to medium-bedded (8–10 cm), planktonic foraminifera-bearing, cream-colored, cherty-clayey limestones (‘scaglia’ of Italian authors). The formation has a 75-m maximum thickness that varies laterally. These limestones are distinctly bedded, particularly at the base of the formation. They include brown iron oxide spots that gradually disappear upward. The middle and upper parts of the formation lack this strong bedding because of the fractured nature of the limestones, especially at the Çakmak Kertiği locality. Brown and gray chert nodules, sometimes coated with white chalk, are abundant in these levels. These nodules are irregular in shape, and their diameters range from 3–20 cm up to 120 cm near the Savran Ekinliği locality (Fig. 5). The limestones of the Akdağ Formation are a planktonic foraminifera-bearing biomericite texture. Examination of the planktonic foraminiferal fauna of the pelagic limestones of the Akdağ Formation has yielded three biozones, in ascending order, *Radotruncana calcarata Total Range Zone, Globotruncana falsostuartii Partial Range Zone and Gansserina gansseri Interval Zone* (Fig. 5).

The presence of two erosional surfaces in the Upper Cretaceous pelagic sequence of the Bey Dağları autochthon is obvious. During post-Santonian regression, hemipelagic limestones of the Bey Dağları Formation were partially or totally eroded and a prominent erosional surface was formed. Latest Campanian pelagic limestones disconformably overlie the pre-upper Turonian and uppermost Turonian-lowermost Coniacian neritic limestones of the Bey Dağları Formation in sections 3 and 4 (Figs. 6–7, respectively). A second erosional phase occurred after the early Maastrichtian. Blocks and large pebbles of the Akdağ Formation are observed at the base of the Paleogene at the Bozcalar dere locality (Fig. 6, section 3). At the Meydandüz Tepe locality, the Paleogene disconformably overlies the hemipelagic limestones (Fig. 2). A rather extreme case is encountered at the Savran Ekinliği locality, where the Paleogene lies directly on the neritic limestones of the Bey Dağları Formation (Fig. 2).

PLANKTONIC FORAMINIFERAL BIOZONES

Examination of forty-five species belonging to eight genera has resulted in the recognition of five planktonic foraminiferal biozones in the Upper Cretaceous (Coniacian-lower Maastrichtian) sequence of the Bey Dağları autochthon. Two of the zones are interval zones (IZ), the *Dicarinella concavata IZ and Gansserina gansseri IZ*, between a first appearance datum (FAD) and a last appearance datum (LAD). Two zones are total range zones (TRZ), the *Dicarinella asymetrica TRZ and Radotruncana calcarata TRZ*, defined by the first and last appearance (total range) of the nominate taxon. One is a partial range zone (PRZ), the *Globotruncana falsostuartii PRZ*, between the LAD of *Radotruncana calcarata* (Cushman) and FAD of *Gansserina gansseri* (Bolli). The range of the nominate taxon (*G. falsostuartii*) exceeds the lower and upper limits of the zone. The biozones identified in this study are briefly described below in ascending order:

*Dicarinella concavata Interval Zone (pro-part)  Dicarinella concavata Interval Zone (pro-part)

The *Dicarinella concavata IZ*, of Coniacian-early Santonian age, has been described by many authors, including Robaszynski and others (1984), Caron (1985), Sliter (1989), Robaszynski and Caron (1995), Robaszynski (coordinator, 1998), Premoli Silva and Sliter (1994), Robaszynski and others (2000) and Premoli Silva and Verga (2004). The zone
is defined as the interval from the first appearance datum (FAD) of *Dicarinella concavata* (Sigal) to the FAD of *D. asymetrica* (Brotzen).

In this study, the appearance of the globotruncanids, together with *Dicarinella concavata* in the transition zone between the neritic and hemipelagic limestones, are accepted as the beginning of the zone in a local sense. The lower limit of this zone corresponds to the Turonian-Coniacian boundary, because these hemipelagic limestones grade into the upper Turonian rudistid neritic limestones towards the base (Fig. 4).

The planktonic foraminiferal assemblage accompanying *Dicarinella concavata* is rather poor in diversity. It contains *Marginotruncana coronata* (Bolli), *M. pseudolinneiana* Pessagno – *Globotruncanina linneiana* (d’Orbigny) group, and *Hedbergella* sp. Besides abundant spheroids, a few bentonic foraminifera (*Rotalina* sp. and *Goupillaudina* sp.), bryozoans, bivalves and rudist fragments are also encountered (Fig. 4).

The *Dicarinella concavata* IZ is the oldest zone identified in the present study and corresponds to the lower part of the hemipelagic limestones of the Bey Dağları Formation. It ranges from sample 31 to sample 27 and represent a 5-m-thick interval (Fig. 4).

**Dicarinella asymetrica** Total Range Zone

This zone (Fig. 4) is characterized by the FAD and LAD of the nominate taxon, and corresponds to the middle-late
Figure 5. Vertical distribution of planktonic foraminiferal species at section 2 in the northeastern part of the study area. See Figure 2 for location.

*Dicarinella asymetrica* TRZ is the last zone of the hemipelagic limestones of the Bey Dağları Formation. It ranges from sample 27 to sample 17 and forms the uppermost 9 m of the massive limestones (Fig. 4).

*Radotruncana calcarata* Total Range Zone

The *Radotruncana calcarata* TRZ (Fig. 5) is defined as the interval from the FAD to the LAD of the nominate taxon, and corresponds to the early late Campanian (Robaszynski, coordinator, 1998; Premoli Silva and Sliter, 1994; Robaszynski and others, 2000; Premoli Silva and Verga, 2004).
In the Korkuteli sequence, the beginning of the Campanian is marked by a distinct faunal turnover of the planktonic foraminifera. Many Coniacian-Santonian species became extinct at the boundary, and many new single- and double-keeled species appeared by the beginning of the Campanian. However, some species such as *Contusotruncana fornicata* (Gandolfi) make their first appearance in this zone.

The extinction of *Radotruncana calcarata* had long been used to draw the Campanian-Maastrichtian boundary (Robaszynski and others, 1984; Caron, 1985; Almogi-Labin and others, 1986; Sliter, 1989). However, Robaszynski and Caron (1995) noted that an accurate calibration had not been published. They also stated that *R. calcarata* disappeared before the base of the *Nostoceras (Nostoceras) hyatti* Zone (ammonite zone dating of uppermost Campanian), so the *R. calcarata* zone might be a little older. As noted by Premoli Silva and Sliter (1994), the Campanian-Maastrichtian boundary was equated to the chron 32N/chron 31R boundary and shifted to 71.3 Ma by Lommerzheim and Hambach (1992) and Gradstein and others.

**Figure 7.** Vertical distribution of planktonic foraminiferal species at section 4 in the southwestern part of the study area. See Figure 2 for location of the section and Figure 4 for explanation.
That means the *Radotruncana calcarata* TRZ does not correspond to the uppermost part of the Campanian; moreover, the *Globotruncanella havanensis* and *Globotruncanca aegyptiaca* Zones, and even the lower part of the *Gansserina gansseri* Zone, are all late Campanian in age as well. This placement was accepted by subsequent biostратigraphic studies (Robaszynski and others, 2000; Premoli Silva and Verga, 2004).

This is the first zone of the Campanian in the study area where the lower and middle Campanian were not deposited or eroded. The *Globotruncanca elevata* IZ and *Globotruncanca ventricosa* IZ are absent in all measured stratigraphic sections. The *Radotruncana calcarata* TRZ corresponds to the base of the Akdağ Formation. It ranges from sample 109 to sample 143, and represents a 42-m-thick interval (Fig. 5).

*Globotruncanca falsostuartii* Partial Range Zone

The *Globotruncanca falsostuartii* PRZ represents the stratigraphic interval that includes *G. falsostuartii* between the LAD of *Radotruncana calcarata* and FAD of *Gansserina gansseri*, and corresponds to the middle late Campanian (Robaszynski, coordinator, 1998). Robaszynski and others (1984 and 2000) used this zone, whereas Caron (1985), Sliter (1989), Robaszynski and Caron (1995), Robaszynski (1994). That means the *Radotruncana calcarata* TRZ does not correspond to the uppermost part of the Campanian; moreover, the *Globotruncanella havanensis* and *Globotruncanca aegyptiaca* Zones, and even the lower part of the *Gansserina gansseri* Zone, are all late Campanian in age as well. This placement was accepted by subsequent biostратigraphic studies (Robaszynski and others, 2000; Premoli Silva and Verga, 2004).

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*Gansserina gansseri* Interval Zone (pro-part)

The *Gansserina gansseri* IZ has been defined by many authors (Robaszynski and others, 1984; Caron, 1985; Sliter, 1989; Robaszynski and Caron, 1995; Robaszynski coordinator, 1998; Premoli Silva and Sliter, 1994; Robaszynski and others, 2000; Premoli Silva and Verga, 2004) as an interval between the FAD of the nominate species and the FAD of *Abathomphalus mayaraensis* (Bolli). In this study, the upper limit of the zone is characterized by the disappearance of the nominate species together with all Upper Cretaceous planktonic foraminifera near the end of the early Maastrichtian.

The *Gansserina gansseri* IZ is only partly represented due to the truncation of the Upper Cretaceous pelagic carbonates. The upper part of the *G. gansseri* IZ and *Abathomphalus mayaraensis* TRZ (upper Maastrichtian) are absent in all measured stratigraphic sections in the Korkuteli area.


This zone corresponds to the middle parts of the Akdağ Formation. It ranges from sample 144 to sample 52, and represents a 25-m-thick interval (Fig. 5).

*Gansserina gansseri* Interval Zone (pro-part)

The *Gansserina gansseri* IZ has been defined by many authors (Robaszynski and others, 1984; Caron, 1985; Sliter, 1989; Robaszynski and Caron, 1995; Robaszynski coordinator, 1998; Premoli Silva and Sliter, 1994; Robaszynski and others, 2000; Premoli Silva and Verga, 2004) as an interval between the FAD of the nominate species and the FAD of *Abathomphalus mayaraensis* (Bolli). In this study, the upper limit of the zone is characterized by the disappearance of the nominate species together with all Upper Cretaceous planktonic foraminifera near the end of the early Maastrichtian.

The *Gansserina gansseri* IZ is only partly represented due to the truncation of the Upper Cretaceous pelagic carbonates. The upper part of the *G. gansseri* IZ and *Abathomphalus mayaraensis* TRZ (upper Maastrichtian) are absent in all measured stratigraphic sections in the Korkuteli area.

TAXONOMIC REMARKS

Planktonic foraminifera observed in the hemipelagic limestones of the Bey Dağları Formation (Dickinella asymetrica TRZ and D. asymetrica TRZ) are generally scarce and have low diversity. By contrast, the planktonic foraminiferal assemblages from the Akdağ Formation (Rudiocyclina calcarata TRZ, Globotruncanina falsostuari PRZ and Gansserina gansseri IZ) are diverse. The specimens are large, thick-walled and complex morphotypes (K-selection) which dominate in open oceans, mainly during the onset of high stands of sea level (Robaszynski and Caron, 1995).

Forty-five planktonic foraminiferal species belonging to eight genera have been identified from the Upper Cretaceous (Coniacian-early Maastrichtian) sequence of the Bey Dağları autochthonous unit. Two dimensional, axial views of some species have similar features and cannot be separated from each other in thin section. These species have been grouped together into the four groups: the Globotruncanina conica-G. atlantica group, the Marginotruncanina marginata-Globotruncanum bulloides group, the M. pseudolineatina-G. lineatina group and the Radotruncanum subspinoso-R. calcarata group.

All of the species are illustrated in three plates (pl. 1–3). Primary or nominate species and secondary, stratigraphically important species are described below. The species are discussed and figured in the order of genera in alphabetical order.

Genus Contusotruncanum KORCHAGIN, 1982

Contusotruncanum contusa (CUSHMAN, 1926)

Pl. 1, Fig. 2

Psilinula arca CUSHMAN var. contusa CUSHMAN, 1926, p. 23, no type figure.
Rosita contusa (CUSHMAN).- ROBASZYNSKI and others, 1984, p. 246–248, pl. 35, figs. 6, 9; pl. 36, figs. 1, 2; pl. 37, figs. 1–3.
Rosita contusa (CUSHMAN).- ÖZKAN and KÖYLUOĞLU, 1988, p. 384, pl. 4, figs. 3, 4.

Contusotruncanum contusa (CUSHMAN).- PREMOLI SILVA and SLITER, 1994, pl. 17, fig. 6; pl. 23, fig. 8.

Description: Test very high trochospiral; profile asymmetrical due to strong convexity of spiral side; umbilical side flat to concave; two closely-spaced keels but the umbilical keel is generally less developed or absent on the last chambers; keel band strongly tilted towards the umbilical side and especially perpendicular to the coiling axis; chamber surface on the spiral side undulated, sutures raised; adumbilical ridges poorly developed.

Remarks: Contusotruncanum contusa differs from C. patelliformis in having a more strongly convex spiral side, in a more undulating chamber surface on the spiral side, and in a larger size. It differs from C. plicata in having a larger number of whorls, a much larger size and raised sutures. It also differs from C. wolfschensinis in its large size, undulating but not inflated chamber surface on the spiral side and raised sutures. The species also differs from Globotruncanina conica-G. atlantica group in having two closely spaced keels and in a more undulating chamber surface on the spiral side.

Occurrence: This form occurs rarely in the uppermost part of the Akdağ Formation. It is found in the Gansserina gansseri IZ.}

Genus Dickinella PORTHAULT, 1970

Dickinella asymetrica (SIGAL, 1952)

Pl. 1, Fig. 8

Globotruncanina asymetrica SIGAL, 1952, p. 34–35, fig. 35.
Dickinella asymetrica (SIGAL).- CARON, 1985, p. 43, figs. 17 (3–4).
Dickinella asymetrica (SIGAL).- SLITER, 1989, p. 11, pl. 3, fig. 1.
Dickinella asymetrica (SIGAL).- PREMOLI SILVA and SLITER, 1994, pl. 12, fig. 11.

Description: Test low to flat trochosphiral, spiral side slightly convex to flat, umbilical side strongly convex; two closely spaced distinct keels on the edge of the spiral side; well-developed perihemispherical ridges on umbilical side; umbilicus wide and deep; early chambers globular, final chambers generally trapezoidal and umbilical margin angular.

Remarks: It differs from Dickinella concavata in having an angular chamber profile on the umbilical side and in the presence of a generally well-developed perihemispherical ridge throughout the last whorl.

Occurrence: This form is common in the upper part of the hemipelagic limestones of the Bey Dağları Formation. It is restricted to the Dickinella asymetrica TRZ.

Dickinella concavata (BROTZEN, 1934)

Pl. 1, Fig. 10

Rotalia concavata BROTZEN, 1934, p. 66, pl. 3, fig. b.
Dickinella concavata (BROTZEN).- CARON, 1985, p. 45, figs. 17 (7–8).
Dickinella concavata (BROTZEN).- SLITER, 1989, p. 11, pl. 2, fig. 11.
Dickinella concavata (BROTZEN).- PREMOLI SILVA and SLITER, 1994, pl. 12, fig. 1.

Description: Test low to flat trochosphiral; spiral side flat, slightly convex to slightly concave; umbilical side strongly convex; two closely spaced keels on the edge of the spiral side, keels distinct on the last chambers and indistinct on the first chambers of the last whorl and probably in the inner whorls; early chambers globular; chambers hemispherical and chamber surface sometimes pustulose on umbilical side; adumbilical ridge generally absent but sometimes slightly developed.

Remarks: It differs from Dickinella asymetrica in having hemispherical chambers and in not having well-developed perihemispherical ridges on the umbilical side, at least on the first chambers of the last whorl.

Occurrence: This form occurs commonly throughout the hemipelagic limestones of the Bey Dağları Formation. It is found in the Dickinella concavata IZ and D. asymetrica TRZ.

Genus Gansserina CARON, GONZALEZ DONOSO, ROBASZYNSKI and WONDERS, 1984

Gansserina gansseri (BOLLI, 1951)

Pl. 1, Fig. 12

Globotruncanina gansseri BOLLI, 1951, p. 196–197, pl. 35, figs. 1–3.
Gansserina gansseri (BOLLI).- ROBASZYNSKI and others, 1984, p. 294, 296, pl. 52, figs. 1–5; pl. 53, figs. 1–5.
Gansserina gansseri (BOLLI).- SLITER, 1989, p. 11, pl. 3, fig. 7.
Gansserina gansseri (BOLLI).- PREMOLI SILVA and SLITER, 1994, pl. 20, figs. 5, 7.

Description: Test very low trochosphiral; profile strongly asymmetrical due to a very slightly concave, sometimes convex to flat spiral side and strongly convex umbilical side; staircase aspect on the spiral side results from imbricated chambers that sometimes developed; single keel throughout; chamber profile hemispherical; sutures on the spiral side raised; chamber surface smooth but sometimes slightly inflated; chamber surface of the umbilical side inflated and pustulose, last chamber surface less pustulose or smooth; adumbilical ridges absent.
Gansserina wiedenmayeri (GANDOLFI, 1955)  

Genus Gansserina CUSHMAN, 1927  

Description: Test very low to flat trochospiral; profile distinctly asymmetrical due to a flat, slightly convex to slightly concave spiral side and a convex umbilical side; last chamber sometimes highly ridged; two keels very closely spaced, but sometimes umbilical keel less-developed or absent on the last chamber; chamber surface on the spiral side flat to slightly inflated, sutures raised; chamber surface on the umbilical side pustulose; adumbilical ridges absent.

Remarks: Gansserina wiedenmayeri differs from G. gansseri in having closely spaced double keels. It differs from Globotruncana aegyptiaca in its flatter chamber surface on the spiral side, and in the absence of adumbilical ridges. It is also distinguished from G. ventricosa by having two very closely spaced keels and by the absence of adumbilical ridges.  

Occurrence: This form occurs rarely in the uppermost part of the Akdağ Formation. It is found in the Gansserina gansseri IZ.

Globotruncana dupeublei CARON, GONZALES DONOSO, ROBASZYNSKI and WONDERS, 1984  

Pl. 2, Fig. 2  

Description: Test moderately high trochospiral; profile nearly symmetrical, moderately convex on both spiral and umbilical sides, but spiral side especially more convex; two distinct keels separated by a large peripheral band, equally developed and parallel throughout the last whorl; keel band tilted towards the umbilical side. Sutures on the spiral side raised and beaded; adumbilical ridges well developed; umbilicus wide and deep.

Remarks: Globotruncana arca differs from G. marieti in its two generally widely spaced and well-marked keels. It differs from G. rosetta in generally having a more convex spiral side and in the presence of two widely spaced distinct keels on all chambers. The species differs from G. falsostuarti in the presence of two widely separated keels throughout the last whorl. It differs from G. orientalis in the presence of two widely spaced keels on all chambers. It is also distinguished from Contusotruncana fornicata by having less elongated and less undulating chambers on the spiral side.

Occurrence: This form occurs abundantly throughout the Akdağ Formation, from the R. calcarata TRZ to the lower part of the Gansserina gansseri IZ.

Globotruncana esnehensis NAKKADY, 1950  

Pl. 1, Fig. 15  

Description: Test moderately high trochospiral; profile nearly symmetrical, moderately convex on both spiral and umbilical sides, but spiral side especially more convex; two distinct keels separated by a large peripheral band, equally developed and parallel throughout the last whorl; keel band tilted towards the umbilical side. Sutures on the spiral side raised and beaded; adumbilical ridges well developed; umbilicus wide and deep.

Remarks: Globotruncana arca differs from G. marieti in its two generally widely spaced and well-marked keels. It differs from G. rosetta in generally having a more convex spiral side and in the presence of two widely spaced distinct keels on all chambers. The species differs from G. falsostuarti in the presence of two widely separated keels throughout the last whorl. It differs from G. orientalis in the presence of two widely spaced keels on all chambers. It is also distinguished from Contusotruncana fornicata by having less elongated and less undulating chambers on the spiral side.

Occurrence: This form occurs abundantly throughout the Akdağ Formation, from the R. calcarata TRZ to the lower part of the Gansserina gansseri IZ.
PLATE I

1- *Globotruncana linneiana* (d'ORBIGNY); axial section; sample 231; *Gansserina gansseri* interval zone; latest Campanian-early Maastrichtian. 2- *Contusotruncana contusa* (CUSHMAN); axial section; sample 238; *Gansserina gansseri* interval zone; latest Campanian-early Maastrichtian. 3- *Contusotruncana fornicata* (PLUMMER); subaxial (nearly axial) section; sample 53; *Gansserina gansseri* interval zone; latest Campanian-early Maastrichtian. 4- *Contusotruncana patelliformis* (GANDOLFI); subaxial (nearly axial) section; sample 237; *Gansserina gansseri* interval zone; latest Campanian-early Maastrichtian. 5- *Contusotruncana plicata* (WHITE); subaxial (nearly axial) section; sample 197; *Gansserina gansseri* interval zone; latest Campanian-early Maastrichtian.
Globotruncana falsostuarti SIGAL, 1952
Pl. 2, Fig. 4
Globotruncana falsostuarti SIGAL, 1952, p. 43, tf. 46.
Globotruncana falsostuarti SIGAL-- ROBASZYSKNI and others, 1984, p. 194, pl. 10, figs. 1–3.
Globotruncana falsostuarti SIGAL-- ÖZKAN and KÖYLÜOĞLU, 1988, p. 383, pl. 2, fig. 1.

Description: Test moderately high trochosorial; profile symmetrical to asymmetrical because of a higher convexity of either side; two keels, but umbilical keel less developed and generally absent towards the end of the last whorl; keels typically closer in the middle of each chamber; keel band tilted towards the umbilical side; sutures on the spiral side raised; adumbilical ridges well developed.

Remarks: Globotruncana falsostuarti differs from G. arcas and G. orientalis in having closely spaced double keels on the first chambers of the last whorl and a single keel throughout the last chambers of the last whorl. It differs from G. rosetta in having closely spaced keels and a generally more convex spiral side and less convex umbilical side. It differs from G. esnehensis and G. deupuebeli in having double keels and from Globotruncanita stauri in having a double-keeled profile.

Occurrence: This form is not common in the Akdağ Formation. It is found rarely in the uppermost part of the Globotruncana falsostuarti PRZ and is relatively common in the Gansserina gansseri IZ.

Globotruncana rosetta (CARSEY, 1926)
Pl. 2, Fig. 9
Globoigerina rosetta CARSEY, 1926, p. 44, pl. 5, figs. 3a–b.
Globotruncana rosetta (CARSEY)-- ROBASZYSKNI and others, 1984, p. 210, 301, pl. 18, figs. 1–5.
Globotruncana rosetta (CARSEY)-- ÖZKAN and KÖYLÜOĞLU, 1988, p. 381, pl. 2, figs. 5,6.

Description: Test generally low trochosorial; profile rarely symmetrical to asymmetrical due to higher convexity of umbilical side; spiral side flat to slightly convex; two closely spaced keels, generally a single keel on the last chambers; sutures on the spiral side raised; chamber surface on the umbilical side smooth; adumbilical ridges generally well developed.

Remarks: Globotruncana rosetta differs from G. ? insignis in having double keels. It differs from G. mariet in having closely spaced keels or a single keel on final chambers, and in having a less convex spiral side and more convex umbilical side. It is distinguished from G. orientalis by its less convex spiral side, and more convex umbilical side.

Occurrence: This form is common in the Akdağ Formation. It is found from the Radotruncana calcarata TRZ to the Gansserina gansseri IZ.

Globotruncana ventricosa WHITE, 1928
Pl. 2, Fig. 10
Globotruncana canaliculata (REUSS) var. ventricosa WHITE, 1928, p. 284, pl. 38, figs. 3a–c.
Globotruncana ventricosa WHITE-- ROBASZYSKNI and others, 1984, p. 214, 216, pl. 20, figs. 1–3; pl. 21, figs. 1–4.
Globotruncana ventricosa WHITE-- ÖZKAN and KÖYLÜOĞLU, 1988, p. 381, pl. 2, fig. 7.
Globotruncana ventricosa WHITE--SLITER, 1989, p. 13, pl. 3, figs. 5,6.

Description: Test very low to flat trochosorial; profile asymmetrical due to higher convexity of umbilical side; spiral side flat to slightly convex; equally developed, generally two widely spaced keels throughout; chambers triangular in outline; sutures on the spiral side raised; adumbilical ridges generally developed on all chambers except last ones.

Remarks: Globotruncana ventricosa differs from G. aegyptiaca in having widely spaced keels and in the absence of localized inflation of the chambers on the spiral side. It differs from G. limneiana in its much more convex umbilical side. It also differs from G. rosetta in having more widely spaced keels which are present throughout, and in having a slower increase in chamber size. The species is distinguished from Dicarinella asymetrica by its more widely spaced keels, and in not having globular chambers in earlier whorls.

Occurrence: This form occurs abundantly in the Akdağ Formation. It is found from the Radotruncana calcarata TRZ to the Gansserina gansseri IZ.

Genus Globotruncanita REISS, 1957
Globotruncanita angulata (TILEV, 1951)
Remarks: The species having a highly convex spiral side, flat or slightly convex umbilical side and one peripheral keel are grouped as ‘Globotruncanita conica-G. atlantica group’ because G. conica and G. atlantica have the same features in two-dimensional view and cannot be separated in thin section. The species differs from Globotruncanita eschenhensis in its more convex spiral side and large number of chambers. It differs from G. pseudonatica in always having one keel throughout. It is also separated from G. stuarti by its asymmetrical profile with strongly convex spiral side and generally flat umbilical side, and less well-marked adumbilical ridges.

Occurrence: This form is common in the uppermost part of the Akdağ Formation. It occurs in the Gansserina gansseri IR.

Globotruncanita elevata (BROTZEN, 1934)

Pl. 2, Fig. 14

Rotalia elevata BROTZEN, 1934, p. 66, pl. 3, fig. c.

Globotruncanita elevata (BROTZEN).- ROBASZYNSKI and others, 1984, p. 228, 230, pl. 27, figs. 1–3; pl. 28, figs. 1–3.

Globotruncanita elevata (BROTZEN).- ÖZKAN and KÖYLÜOĞLU, 1988, p. 381, pl. 3, figs. 3,4.

Globotruncanita elevata (BROTZEN).- SLITER, 1989, p. 15, pl. 3, figs. 3,4.

Globotruncanita elevata (BROTZEN).- SLITER, 1994, p. 18, figs. 5,7.

Description: Test very low trochospiral; profile asymmetrical due to flat to slightly concave spiral side and strongly convex umbilical side; early whorls slightly convex, forming central cone on the spiral side; last whorl slightly convex to generally concave; highly developed last chamber generally with right to obtuse peripheral angle; one keel throughout but sometimes weak double keel on the first chambers of the last whorl; sutures on the spiral side raised; adumbilical ridges developed on all chambers except last one.

Remarks: Globotruncanita elevata differs from Globotruncanita ? insigins in having a prominent central cone on the spiral side, well-developed last chamber and more highly vaulted umbilical side. It is distinguished from G. angulata and G. pettersi by its pronounced central cone and highly developed last chamber with right to obtuse peripheral angle. Globotruncanita angulata and G. pettersi also differ from G. elevata in having a smaller, narrower umbilicus. It differs from G. stuartiformis in its planoconvex profile, larger umbilicus, and generally concave chamber surface on the spiral side.

Occurrence: This form occurs very abundantly in the lowermost part of the Akdağ Formation. It is abundant in the lower part of the Radotruncanita calcarata TRZ and represented by only one specimen in the lower part of the Globotruncanita falsostuarti PRZ (Fig.4, sample 36).

Globotruncanita pettersi (GANDOLFI, 1955)

Pl. 2, Fig. 15

Globotruncanita (Globotruncanina) rosetta (CARSEY) subsp. pettersi GANDOLFI, 1955, p. 68, pl. 6, figs. 3a–c, 4a–c.

Globotruncanita pettersi (GANDOLFI).- ROBASZYNSKI and others, 1984, p. 232, pl. 29, figs. 1–5.

Globotruncanita pettersi (GANDOLFI).- ÖZKAN and KÖYLÜOĞLU, 1988, p. 383, pl. 3, figs. 5,6.

Description: Test very low trochospiral; profile asymmetrical due to slightly convex to flat spiral side and strongly convex umbilical side; one peripheral keel throughout; acute peripheral angle; sutures on the spiral side raised; adumbilical ridges less developed; umbilicus wide and deep.

Remarks: Globotruncanita pettersi differs from Globotruncanita ? insigins and G. stuartiformis in having an almost flat spiral side and in its more rapidly developed last chamber. It differs from G. angulata in its more conical profile of the umbilical side and in more tightly coiled spire. It is distinguished from G. elevata by not having a central cone on the spiral side, by its more conical profile on the umbilical side, and its acute peripheral angle. The species also differs from Gansserina gansseri in its more conical profile on the umbilical side and in having adumbilical ridges.

Occurrence: This form is common in the uppermost part of the Akdağ Formation. It is found in the Gansserina gansseri IR.

Globotruncanita stuarti (de LAPPARENT, 1918)

Pl. 3, Fig. 1

Rosalina stuarti de LAPPARENT, 1918, p. 11, tf. 4, lower 3 figs.

Globotruncanita stuarti (de LAPPARENT).- ROBASZYNSKI and others, 1984, p. 234, pl. 22, figs. 1–3; pl. 30, figs. 1–3; pl. 31, figs. 1–3.

Globotruncanita stuarti (de LAPPARENT).- ÖZKAN and KÖYLÜOĞLU, 1988, p. 383, pl. 3, figs. 7,8.

Globotruncanita stuarti (de LAPPARENT).- PREMOLI SILVA and SLITER, 1994, pl. 18, figs. 2,10.

Description: Test moderately high trochospiral; profile symmetrical to asymmetrical due to higher convexity of umbilical side; single keel throughout; sutures on the spiral side raised; adumbilical ridges developed on all chambers; umbilicus wide and deep.

Remarks: Globotruncanita stuarti differs from G. conica - G. atlantica group in having a biconvex profile, in its more convex umbilical side and more well-marked adumbilical ridges. It differs from Globotruncanina dupeublei in its biconvex profile and more convex spiral side. It differs from G. elevata in its biconvex test and in the absence of a central cone on the spiral side. It also differs from G. stuartiformis in its more convex spiral side and its less rapid increase of the last chamber.

Occurrence: This form occurs abundantly in the upper part of the Akdağ Formation. It is common in the G. falsostuarti PRZ and abundant in the Gansserina gansseri IR.

Genus Marginotruncanina HOFKER 1956

Marginotruncanina coronata (BOLL, 1945)

Pl. 3, Fig. 3

Globotruncanina (Globotruncanina) lapparenti BROTZEN subsp. coronata BOLL, 1945, p. 233, fig. 1/21, pl. 9, fig. 14.

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1- Globotruncanina bulloides Vogler; subaxial (nearly axial) section; sample 121; Radoetruncanina calcarata total range zone; early late Campanian.
2- Globotruncanina dupeublei CARON and others; subaxial (nearly axial) section; sample 185; Gansserina gansseri interval zone; latest Campanian-early Maastrichtian.
3- Globotruncanina eschenhensis NAKKADY; sample 195; Gansserina gansseri interval zone; latest Campanian-early Maastrichtian.
4- Globotruncanina falsostuarti SIGAL; subaxial (nearly axial) section; sample 229; Gansserina gansseri interval zone; latest Campanian-early Maastrichtian.
5- Globotruncanina (? ) insigins GANDOLFI; subaxial section; sample 233; Gansserina gansseri interval zone; latest Campanian-early Maastrichtian.
6- Globotruncanina mariei BANNER & BLOW; subaxial (nearly axial) section; sample 234; Gansserina gansseri interval zone; latest Campanian-early Maastrichtian.
7- Globotruncanina orientalis EL NAGGAR; axial section; sample 120; Radoetruncanina calcarata total range zone; early late Campanian.
8- Globotruncanina pseudonatica SOLAKIU; axial section; sample 17; Radoetruncanina calcarata total range zone; early late Campanian.
9- Globotruncanina rosetta (CARSEY); subaxial section; sample 237; Gansserina gansseri interval zone; latest Campanian-early Maastrichtian.
10- Globotruncanina ventricosa WHITE; subaxial (nearly axial) section; sample 239; Gansserina gansseri interval zone; latest Campanian-early Maastrichtian.
11- Globotruncanina havanaensis (VOORWIJK); axial section; sample 242; Gansserina gansseri interval zone; latest Campanian-early Maastrichtian.
12-Globotruncanica angulata (TILEY); subaxial (nearly axial) section; sample 240; Gansserina gansseri interval zone; latest Campanian-early Maastrichtian.
13- gr. Globotruncanita conica-Globotruncanita atlantica; axial section; sample 233; Gansserina gansseri interval zone; latest Campanian-early Maastrichtian.
14- Globotruncanita elevata (BROTZEN); subaxial (nearly axial) section; sample 115; Radoetruncanina calcarata total range zone; early late Campanian.
15- Globotruncanita pettersi (GANDOLFI); subaxial section; sample 235; Gansserina gansseri interval zone; latest Campanian-early Maastrichtian.
**Genus Radotruncana EL-NAGGAR 1971**

Radotruncana calcarata (CUSHMAN, 1927)

Pl. 3, Fig. 10

Globotruncana calcarata CUSHMAN, 1927, p. 115, pl. 23, fig. 10a–b.

Globotruncana calcarata (CUSHMAN).– ROBASZYNSKI and others, 1984, p. 224, pl. 22, fig. 4; pl. 25, figs. 1–3.

Globotruncana calcarata (CUSHMAN).– ÖZKAN and KÖYLÜO-GLU, 1988, p. 382, pl. 2, figs. 11,12.

Globotruncana calcarata (CUSHMAN).– SLITER, 1989, p. 13, pl. 3, fig. 2.

Radotruncana calcarata (CUSHMAN).– PREMOLI SILVA and SLITER, 1994, pl. 18, figs. 8,9.

**Description:** Test low trochospire; profile asymmetrical with flat to slightly convex spiral side and convex umbilical side; in some specimens early whorls on the spiral side generally strongly convex and later ones convex to concave; one peripheral keel throughout forming tubulospinate extensions; acute peripheral angle especially on the early chambers of the last whorl; height of the chambers generally doubling at the end of the last whorl; adumbilical ridges more or less developed.

**Remarks:** Radotruncana calcarata is an important species for recognizing the lowermost part of the late Campanian. It can be easily recognized by its tubulospines; nonetheless, these tubulospines cannot be observed in many of the thin sections because of randomly oriented cuts. Instead, only small tubulospine-like extensions are encountered. It differs from all other Globotruncana species in having tubulospines. In the absence of tubulospines, it is distinguishable by its very acute peripheral angle on the early chambers of the last whorl, generally highly developed last chamber and small tubulospine-like extensions.

**Occurrence:** This form occurs abundantly in the hemipelagic limestones of the Bey Dağları Formation. It is found in the upper part of the Dicarinella concavata TRZ.

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**Radotruncana subspinosus (PESSAGNO)**– Radotruncana calcarata (CUSHMAN) group

Pl. 3, Fig. 11

Globotruncanaita subspinosus (PESSAGNO).– ROBASZYNSKI and others, 2000, pl. 19, fig. 7; pl. 22, fig. 15; pl. 24, fig. 2.

Radotruncana subspinosus (PESSAGNO)– Radotruncana calcarata (CUSHMAN) (transition form).– PREMOLI SILVA and SLITER, 1994, pl. 18, fig. 1.

**Description:** Test low to flat trochospiral; profile asymmetrical with slightly convex to flat spiral side and strongly convex umbilical side; single distinct keel throughout; chambers generally elongated near periphery; sutures on the spiral side raised; adumbilical ridges developed on all chambers.

**Remarks:** The only criteria to separate Radotruncana calcarata from R. subspinosus in thin section is the presence of tubulospines. Otherwise, the two species cannot be distinguished. Hence, the species having elongated chambers near the periphery or a tubulospine-like peripheral keel are grouped as ‘R. subspinosus-R. calcarata group’. The species differs from Globotruncana elevata and G. stuartiformis in having elongated chambers near the periphery, in the more distinct tubulospine-like peripheral keel, and in its polygonal-like outline.

**Occurrence:** This form occurs rarely throughout the Akdağ Formation. It is found from the Radotruncana calcarata TRZ to the Gansserina gansseri TRZ.

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**Paleotectonic and Paleogeographic Inferences of Hiatuses**

Carbonate platforms of the Tethyan ocean passed through the entire geodynamic spectrum of the Wilson cycle (rifting, drifting, transtension, transpression and collision). Hence, tectonics is a primary control on their evolution, with eustatic sea-level oscillations being only a secondary control (Bosellini, 1989). The easternmost Mediterranean area was represented by many carbonate platforms surrounded by small Neotethyan oceanic basins during Late Cretaceous time. The evolution of these carbonate platforms and the overlying pelagic deposits was dominantly controlled by tectonic events such as rifting, spreading and collision (Poisson, 1977; Gutnic and others, 1979; Şengör and Yılmaz, 1981; Poisson and others, 1983; Özgül, 1984; Robertson and Dixon, 1984; Robertson and Woodcock, 1984; Robertson, 1993, 1998; Robertson and others, 2003).

The platform persisted under shallow waters until the end of the late Turonian in the Korkuteli part of the Bey Dağları autochthon. Then in the Coniacian-Santonian, the platform subsided and was capped with massive, hemipelagic limestones. Turonian-lower Senonian regional extension, which affected the peri-Mediterranean alpine...
Figure 9. Lithostratigraphic column of the Upper Cretaceous sequence of the Korkuteli area, plotted against the planktonic foraminiferal biozonation of Robaszynski (coordinator, 1998), time scale of Gradstein and others (1994) and sea-level curve of Haq and others (1987). Note the two hiatuses corresponding to the lower-middle Campanian and Upper Maastrichtian.
The hiatuses in the Bey Dağları autochthon are diachronous. Local and widespread regional hiatuses were detected in the pelagic sequence of the Bey Dağları autochthon in a few previous biostratigraphic studies (Fig. 8). These hiatuses correspond to the late Turonian-middle Campanian in Karatan Dağ (Bignot and Poisson, 1974), the interval between lower and upper Senonian throughout the middle and northern part of the Bey Dağları autochthon (Poisson, 1977), lower-middle Senonian throughout the Taurus shelf (Farinacci and Köylüoğlu, 1982), lower Turonian-upper Coniacian throughout the Bey Dağları autochthon (Farinacci and Yeniat, 1986) and Turonian-Campanian and upper Maastrichtian-Tertiary in the Bey Dağları autochthon (Özkan and Köylüoğlu, 1988).

Detailed geological mapping and measured stratigraphic sections show that the hiatuses in the Korkuteli part of the Bey Dağları autochthonous unit occur in the lower-middle Campanian and upper Maastrichtian. The hiatuses represent breaks in the stratigraphic sequence caused by erosion, dissolution, or nondeposition.

The major control for the early-middle Campanian and late Maastrichtian hiatuses may have been regional tectonics. The Maastrichtian was the closure time for the easternmost Mediterranean area was subjected to important tectonic events during the late Cretaceous. The Upper Maastrichtian hiatus may have been related to compressional tectonics, as the Maastrichtian was the time of closure for the Arabo-African and Eurasian plates and of the initial stages of emplacement of the Antalya complex in the Katran Dağ area (Robertson, 1993). The variations in relative sea level given in Figure 9 are the result of changing paleoceanographic conditions and may have accompanied the tectonic effect as a secondary control on the Upper Cretaceous sequence of the Bey Dağları autochthon.

CONCLUSIONS

Planktonic foraminiferal assemblages of the hemipelagic limestones of the Bey Dağları Formation and the pelagic limestones of the Akdağ Formation have been analyzed in detail and the following conclusions have been drawn:


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PLANKTONIC FORAMINIFERA OF TURKEY


Received 21 September 2004
Accepted 24 January 2006