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SELIMINA SPINALIS N. GEN. N. SP., A NEW UPPER MAASTRICHTIAN FORAMINIFER FROM NORTHEASTERN TURKEY

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KEY WORDS

Foraminifera, New genus (*Selimina*), Systematic, Calcarinidae, Upper Maastrichtian, Northeastern Turkey.

MOTS CLEFS

Foraminifères, Nouveau genre (*Selimina*), Systématique, Calcarinidae, Maastrichtien supérieur, Turquie du nord-est.

ABSTRACT

Selimina spinalis n. gen. n. sp., a new foraminifer from the Upper Maastrichtian of the Gölköy (Ordu), Karaçam, Resadiye (Tokat) and Koyulhisar (Sivas) North Anatolian Fault Zones (NE Turkey) is described. This new genus separate by stratigraphical level, presence of canaliculate spine, biconvex lenticular shape of test, trochospiral coil of lam spiral and canal systems. This new taxon is placed in the Calcarinidae SCHWAGER, 1876.

RÉSUMÉ

Selimina spinalis n. gen. n. sp., un nouveau foraminifère du Maastrichtien supérieur de Turquie du nord-est.-
Selimina spinalis n. gen. n. sp., un nouveau foraminifère est décrit dans le Maastrichtien supérieur de Gölköy (Ordu), Karaçam, Resadiye (Tokat) et de Koyulhisar (Sivas), sur la zone faille Anatolie nord, NE Turkey.
On peut distinguer ce nouveau genre par le niveau stratigraphique, la forme du test biconvexe lenticulaire, les épines canaliculées, l'enroulement trochospiralé de la lame spirale et par le système des canaux. Le nouveau taxon est placé dans la famille des Calcarinidae SCHWAGER, 1876.

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INTRODUCTION

In this study, a new benthic foraminifer genus and species (*Selimina spinalis* n. gen. n. sp.) are described in Upper Maastrichtian aged unit that is located in the regions between Gök köy (Ordu), Karaçam highland (Niksar-Tokat), Resadiye (Tokat), and Koyulhisar (Sivas) (Fig. 1) on the North Anatolian fault zone (KAF) in the Eastern Pontids.

The units in the region were described as different formations by different authors (Fig. 2). Around the Gök köy (Ordu) vicinity, this unit was named as Gök köy formation in Paleocene age by TERLEMEZ & YILMAZ (1980). The bottom levels of this formation consists of grey limestone-marls and red limestone of sandstone lenses in the top levels. According to MERIÇ & INAN (1995), age of this unit goes down to Middle Maastrichtian. In this study, *Selimina spinalis* n. gen. n. sp. is found in Upper Maastrichtian aged levels of unit. Kirandag formation outcrops in Tokat, Karaçam highland (Niksar) and Resadiye. This formation is called by SEYMEN (1975) and top levels of unit are distinguished as Sirakayalar Detritical limestone member of Upper Maastrichtian/Lower Paleocene age. Formation is composed of grey marl-mudstone in the bottom levels and clayey-sandy limestone alternating in the top levels. In this study, *Selimina spinalis* n. gen. n. sp. is found in Upper Maastrichtian aged levels of unit.

Koyulhisar (Sivas) vicinity, reefal limestone of clayey and dolomit levels are called as Iğdir limestone member of Resadiye formation by TERLEMEZ & YILMAZ (1980) and aged Maastrichtian. This unit was called as formation by TOPRAK *et al.* (1988). Besides, this unit was investigated as Upper Maastrichtian-Lower Thanetian age by INAN *et al.* (1992) and INAN (1995). Iğdir formation conformably overlies the Kapaklı formation, which is represented by limestone, marl, tuff, agglomerate, sandstone, siltstone, claystone alternations. This unit is Upper Campanian-Lower Maastrichtian age according to SEYMEN (1975) and Upper Santonian-Middle Maastrichtian age to TOPRAK *et al.* (1988).

Pliocene aged Erdembaba basalts overlies the Iğdir formation. Pliocene-Quaternary aged Koyulhisar formation overlies the Erdembaba basalts. Koyulhisar formation is represented by conglomerate (Fig. 3). According to the microfacies features of limestone of Iğdir formation, the depositional area is lagoon-tidal-reef back environments (Fig. 4). In this study, abundant and nice samples of *Selimina spinalis* n. gen. n. sp. individuals are found in this location (Fig. 4, sample 6).

SYSTEMATIC DESCRIPTION

The classification proposed by LOEBLICH & TAPPAN (1988) has been followed in the present work.

Fig. 1 : The location map of study area.

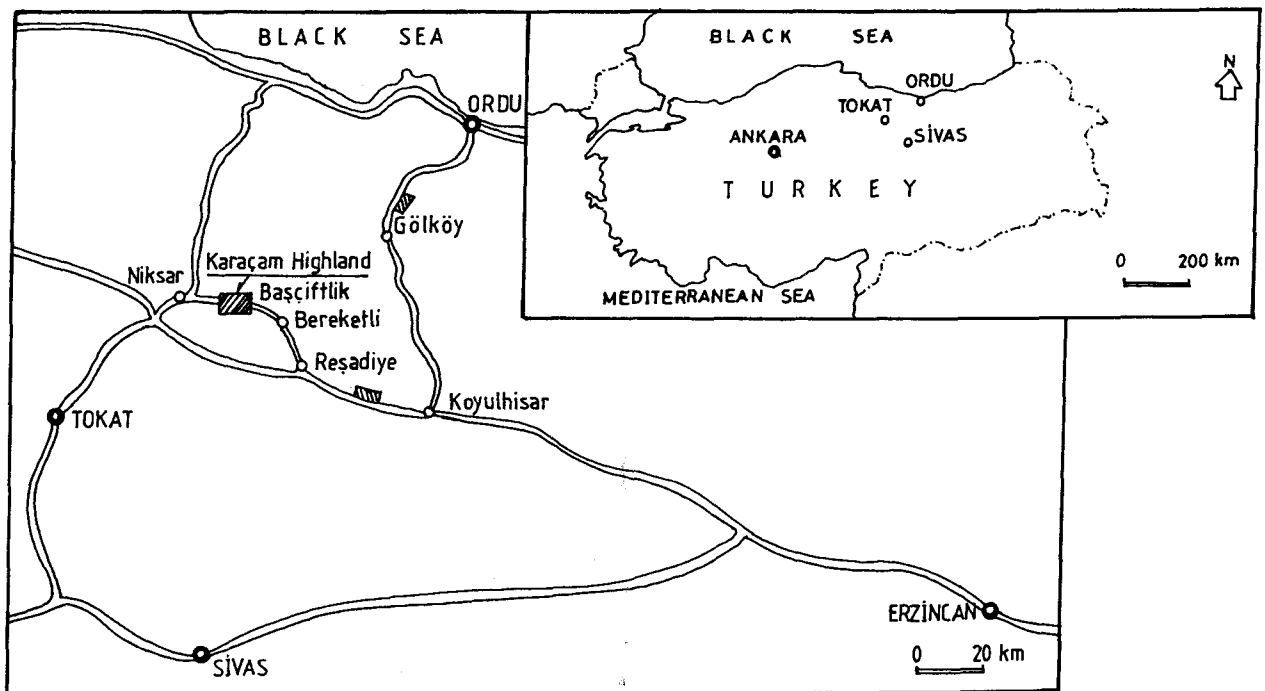
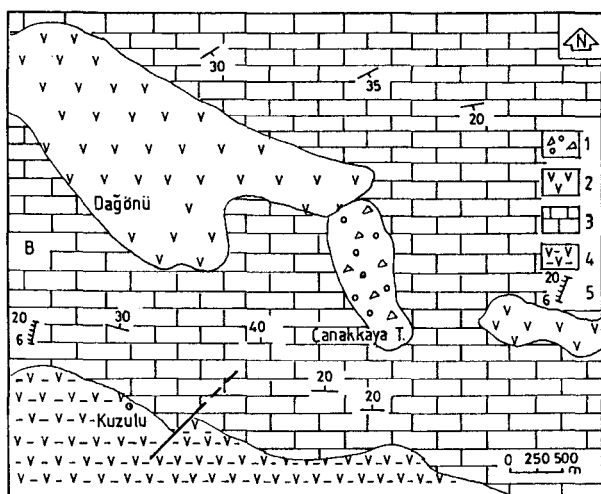


Fig. 2 : The correlation of lithostratigraphic units in the study area.

AGE		Seymen (1975)	Terlemez and Yılmaz (1980)	Toprak et. all. (1988)	İnan et. all (1992) İnan (1995)
		Karaçam yaylası (Niksar) Reşadiye (Tokat)	Gölköy (Ordu) Koyulhisar (Sivas)	Koyulhisar (Sivas)	
Lutetian		Kuzbağı conglomerate	Member Selecik limes. tone Yeşilce Formation	Taşpınar Formation	
Thanetian		Member Dağüstü Limestone of coralls	Gölköy Formation	Düdenyaylası Formation	İğdir Formation
Danian	Upper (Montian)	Düdenyaylası Formation		Şıhlar Formation	
	Lower	Member Sırakayalar detritic limestone		İğdir Formation	
Maastrichtian		Kırandağ Formation	Member İğdir limestone Reşadiye Formation	Aşağıkale Formation	Kapaklı Formation
Campanian		Kapaklı Formation	Mesudiye Formation	Kapaklı Formation	
		Kızıltepe Formation			

Fig. 3 : The simplified geological map of Koyulhisar area.

1 : Koyulhisar Formation - Pliocene - Quaternary (Conglomerate); 2 : Erdembaba Formation - Pliocene (Basalt); 3 : Iğdir Formation - Upper Maastrichtian - Late Thanetian (Limestone, clayey-sandy limestone, dolomitic limestone alternations); 5 : Section Location.



Order : Foraminiferida EICHWALD, 1830
Suborder : Rotaliina DELAGE & HEROUARD, 1896
Superfamily : Toraliacea EHRENBERG, 1839
Family : Calcarinidae SCHWAGER, 1876
Genus : *Selimina* n. gen.

Name :

Dedicated to Professor Dr Selim İNAN who is in Structural Geology section in the Department of Geological Engineering at Cumhuriyet University, Sivas.

Type species :

Selimina spinalis n. gen. n. sp.

Stratigraphic extension :

Upper Maastrichtian.

Description of the genus :

Test is trochospirally coiled, biconvexe-lenticular in shape. Test is radial, lamellar, hyaline, calcareous. Two spinals are present in test periphery that are developed well. Radial equatorial canal systems on sutures and vertical ombilical canals on ombilical filling are present. Chambers are inclined towards the center and probably have an intercameral foramen. Aperture opening consists of apertural lip.

***Selimina spinalis* n. gen. n. sp.**
Pl. I, fig. 1-8; Pl. II, fig. 1-10.

Holotype :

The specimen off-centered spinal axial section, illustrated in Pl. I, fig. 1, is from sample CM 6/3.

Paratype :

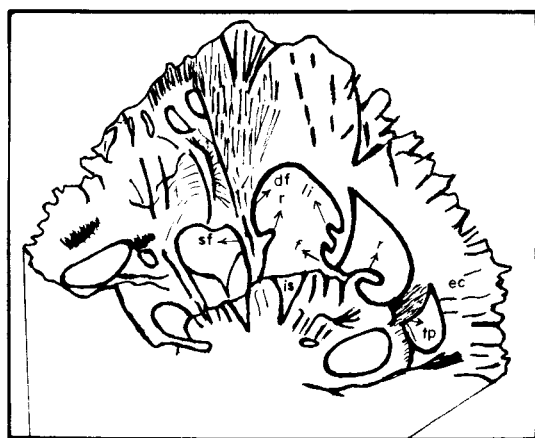
The specimen off-centered spinal equatorial section, illustrated in Fig. 5A.

Type-locality :

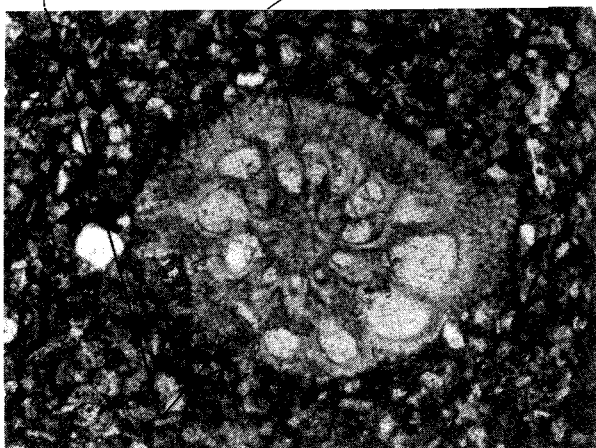
North-east of Sivas, situated about 20 km west of the Koyulhisar village (Fig. 1).

Fig. 5 : *Selimina spinalis* n. gen. n. sp.

A : Paratype, equatorial section, Koyulhisar (Sivas), CM 6/2, x 25; B : Diagram of structural members, x 50; df : distal chamber wall; sf : septal flap; f : intercameral foramen; is : intraseptal interocular space; ec : Radial equatorial canals; r : retral bend; tp : toothplate; li : apertural lip.



B



A

Type-level :

Upper Maastrichtian.

Association :

This genus is found together with the following fossil assemblage :

- In Gököy formation in the Gököy (Ordu) with *Sirelina orduensis* MERIC & INAN, *Scandonea* aff. *sannitica* DE CASTRO, *Dargenioella* sp.
- In Sirakayalar detritic limestone member in the

Karaçam highland (Niksar-Tokat) with *Orbitoides medius* (d'ARCHIAC), *Simplorbites papyraceus* (BOUBEE), *Omphalocyclus macroporus* (LAMARCK), *Hellenocyclina beotica* REICHEL, *Sirtina orbitoidiformis* BRÖNNIMANN, *Siderolites calcitropoides* LAMARCK, *Gaupillaudina* sp.

- In Iğdir formation in the Koyulhisar being type location (Sivas) with *Orbitoides medius* (d'ARCHIAC), *Orbitoides apiculatus* SCHLUMBERGER, *Simplorbites papyraceus* (BOUBEE), *Omphalocyclus macroporus* (LAMARCK), *Sirtina orbitoidiformis* BRÖNNIMANN, *Hellenocyclina beotica* REICHEL, *Siderolites calcitropoides* LAMARCK, *Gaupillaudina* sp. (Fig. 4).

Depository of type material :

All of the described and illustrated specimens have been placed in the micropaleontological collections of the Department of Geological Engineering at Cumhuriyet University, Sivas, Türkiye.

Specific diagnosis :

The equatorial diameter of lenticular test is 1,425-1,475 mm, axial diameter is 1,150-1,525 mm and central thickening is 0,450-0,625 mm. The length of spines in the test periphery is 0,125-0,375 mm. Diameter of proloculus is approximately 75 microns. 2.5-3 whorl is present. The height of first whorl is 0,125-0,225 mm, the height of second whorl is two times of first whorl. First whorl consists of 6-8 chambers, second whorl consists of 12-14 chambers. Chambers length/high ratio is 0,45-0,6.

DESCRIPTION

External features :

The test is coarsely hexagonal perforated (approximately 25 microns diameter) (Pl. II, fig. 7) and biconvexe-lenticular in shape consisting of bloated in central part (Pl. I, fig. 1, 6, 7; Pl. II, fig. 1, 2, 5, 6) ventral side is more convex. The wall is calcareous, radial, lamellar, hyalin that is the characteristic of Rotaliidae superfamily. The maximum diameter of the test ranges from 1.425 mm to 1.425 mm (Fig. 5A). Development of 1-2 spines on test periphery is present (length 0.125 to 0.375 mm).

Internal features :

This new form is trochospirally coiled; proloculus spherical, and its diameter is approximately 75 microns (Fig. 4A). Dimorphism is absent. The spire coil is regular. The test is composed of 2 1/2 to 3 whorls (Pl. I, fig. 3; Pl. II, fig. 9, 10). The height of first whorl is 0.125-0.225 mm, the height of second whorl is two times of first whorl. First whorl consists of 6-8 chambers, second whorl consists of 12-14 chambers.

Chambers that are evolute in dorsal side and involute in ventral side are triangle shape and their length/high ratio is 5/11-3/5. Chambers consist of two walls which are septal face and septal flap. Septas are arc shape and slightly inclined towards the central of test. The compound plug in ombilical side is present (Pl. I, fig. 2; Pl. II, fig. 7, 8). Probably, this plug is included in spiral canal as in *Pseudosiderolites vidali* (DOUVILLE) (WANNIER, 1980). At different spiral whorls; radial equatorial canals which are permanent and connected along septums of spiral whorls are present.

We can see these canals particularly in subequatorial sections (Pl. II, fig. 9, 10). Radial equatorial canals have relationship with spiral canals (Fig. 5A). Some features such as intercameral foramen, retral bend, apertural lip are observed in equatorial sections (Fig. 5B).

In the axial section, foraminas were seen in first whorl (Pl. I, fig. 1). Foraminas can be considered to have connection with radial equatorial canals along peripheral length at septa floor (WANNIER, 1980). Ombilical plug is located in ventral side. It is possible that vertical ombilical canals are arranged as long pillar and these canals allow the connection among different spiral canal whorls. These characteristics have been seen in *Pseudosiderolites vidali* (DOUVILLE) (WANNIER, 1980). The clup-shaped canalliculate spines are present on ventral side (Pl. I, fig. 1, 4-8; Pl. II, fig. 1-6; 9-10). Number of this spines varies between 1 and 2. Particularly well developed spikes at the margins of canal opening of the chamber wall in the canalliculate spines are shown in Fig. 4.

According to 21 axial samples :

	minimum	maximum
Axial diameter	1.150 mm	1.525 mm
Central thickness	0.450 mm	0.625 mm

REMARKS AND CONCLUSION

Selimina spinalis n. gen. n. sp., displays characters of Rotaliacea Superfamily by Rotaloidal test structure, biconvexe-lenticular test shape, trocospirally coiled. This new genus has spines in ventral side thus it belongs to Calcarinidae family.

Selimina spinalis n. gen. n. sp., differs from other Calcarinidae genus by its stratigraphic level, trocospirally coil and spiral canal, radial equatorial canals, intercameral foramen, retral bend, apertural lip, foraminas, alveols in the last spiral whorl as structural members.

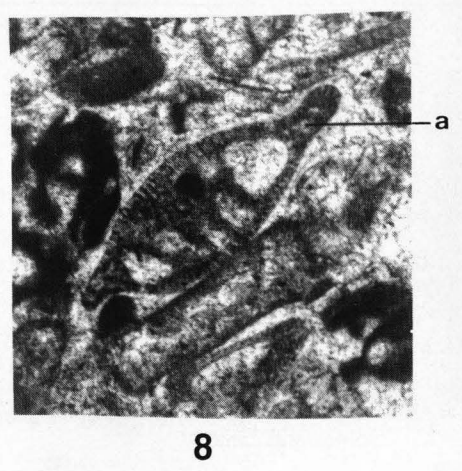
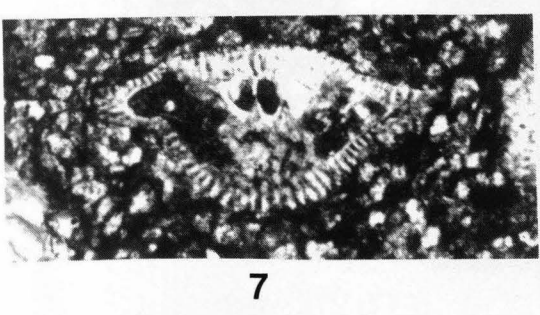
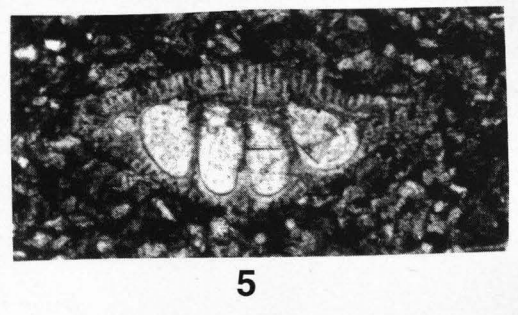
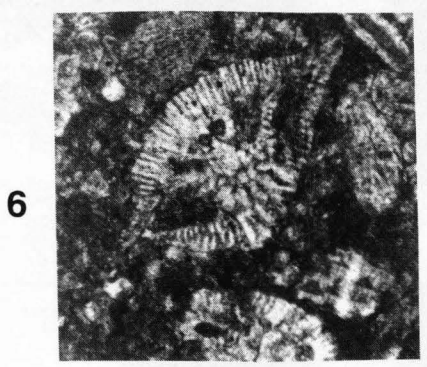
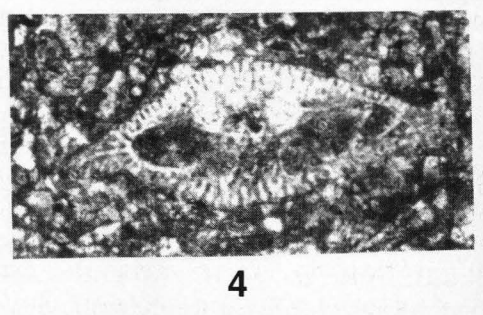
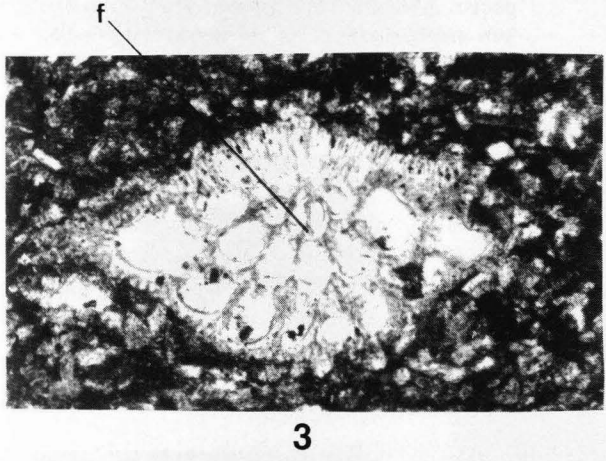
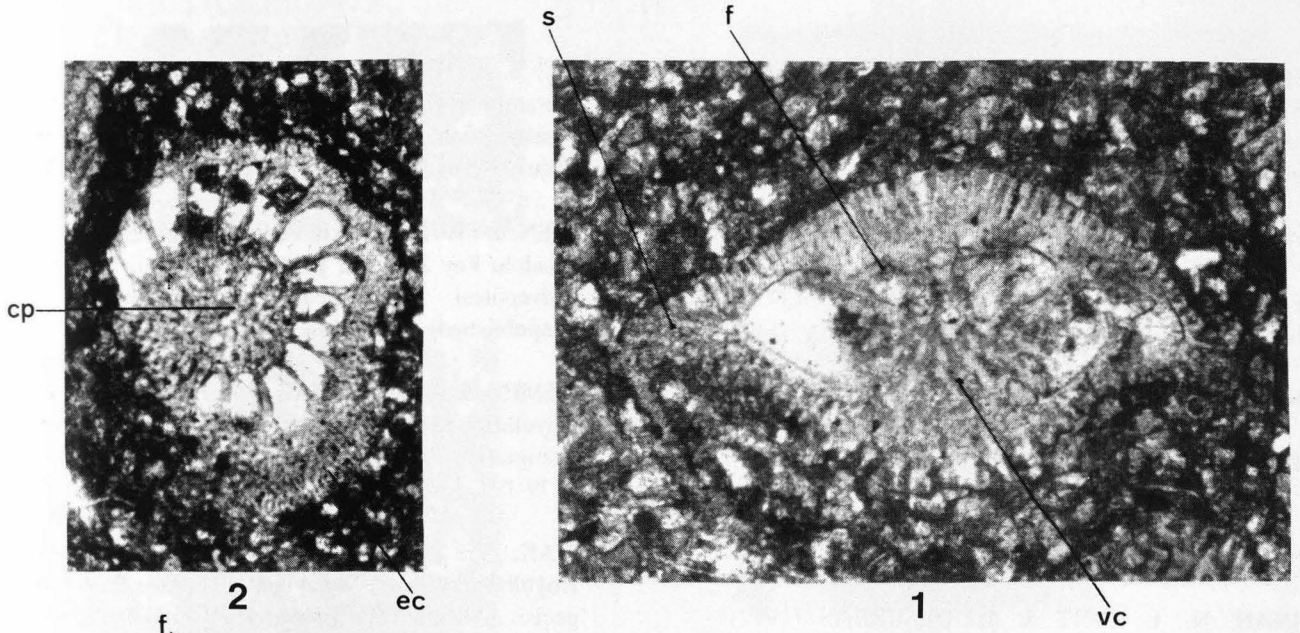
Calcarina D'ORBIGNY, 1826 and *Neorotalia* BERMUDEZ, 1952 species show the same similarity with new genus in respect to coil, spines, canal and chambers arrangement (HOTTINGER *et al.*, 1991). But stratigraphic levels of these species are always Neogene-Recent and don't include spiral canals, radial equatorial canals, foraminas and alveols in the last spiral whorl as morphological members which these members are present in new genus. This new genus may resemble to *Siderolites* LAMARCK, 1801 and *Pseudosiderolites* SMOUT, 1955 genera by spines, radial equatorial canals, foramina system. But *Siderolites* LAMARCK, 1801 and *Pseudosiderolites* SMOUT, 1955 genera are coiled at spiral plan and involute chambers are present. Besides that, *Pseudosiderolites* consists of lateral chambers (WANNIER, 1980). All these features are invisible at new genus. *Selimina* resembles to n. gen. n. sp. which were determined by WANNIER (1980) but n. gen. n. sp. WANNIER (1980) differs from *Selimina* by involute coiling and stratigraphical level.

New genus, in axial section resembles to *Smoutina* DROOGER, 1960 and to *Sirelina* MERIÇ & INAN,

Plate I

Selimina spinalis n. gen. n. sp.

- Fig. 1 : Holotype, axial section, Koyulhisar (Sivas), CM 6/3, x 40. f : foramina; s : spine, vc : ventral canals.
 Fig. 2 : Subequatorial section, Koyulhisar (Sivas), CM 6/4, x 27,5. cp : compound plug; ec : radial equatorial canals.
 Fig. 3, 4 : Subaxial sections of slightly inclined towards equatorial, Koyulhisar (Sivas), fig. 3 : CM 6/1, x 30; fig. 4 : CM 6/6, x 25,8
 Fig. 5 : Tangential section, Koyulhisar (Sivas), CM 6/6, x 26,6.
 Fig. 6, 7 : Axial sections, Karaçam highland (Niksar-Tokat) Koyulhisar (Sivas); fig. 6 : N6, x 25,7; fig. 7 : CM 6/4, x 26,6.
 Fig. 8 : Subaxial section, Gökkyöy (Ordu); GK4; x 24,6. a : alveols in the last spiral whorl.



1995; in equatorial sections to *Cideina* (SIREL, 1991). Spines perforated rotaloidal test structure, canal systems and no lateral chambers are distinctive features of new genus.

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Plate II

Selimina spinalis n. gen. n. sp.

- Fig. 1, 2 : Axial sections, Resadiye (Tokat), Koyulhisar (Sivas), x 25, x 25,8.
- Fig. 3, 4 : Subaxial sections of slightly inclined towards equatorial, Koyulhisar (Sivas); fig. 3 : CM 6/5, x 25, 8; fig. 4 : CM 6/4, x 24,5.
- Fig. 5, 6a : Subaxial sections; Gölköy (Ordu), Koyulhisar (Sivas), fig. 5 : GK 4, x 25,5; fig. 6a : CM 6/2, x 25.
- Fig. 6b : Axial section, Koyulhisar (Sivas), CM 6/2, x 25.
- Fig. 7, 8 : Subequatorial sections close to test surface; Koyulhisar (Sivas), Karaçam highland (Niksar-Tokat); fig. 7 : CM/5, x 25; fig. 8 : IS/74, x 25,7. hp : hexagonal pores in the test surface.
- Fig. 9, 10 : Tangential sections; Tesadiye (Tokat), R103, i.s.e.n.; fig. 9 : x 20,3; fig. 10 : x 33,8. spc : canalliculate spines and canals.

