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CIDEINA, A NEW FORAMINIFERAL GENUS FROM THE MAASTRICHTIAN LIMESTONE OF THE CIDE REGION (NORTH TURKEY)

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ABSTRACT. - In 1973,a discoidal foraminifera was described and figured as *Cuvillierina sözerii* by the present author from the Maastrichtian of Cide region, NE of Zonguldak, Northern Turkey. In this paper, *Cuvillierina sözerii* is reviewed on well preserved and abundant materials of this species from the type locality. In the light of the obtained new generic features, *C. sözerii* is transfered to the genus *Cideina* n. gen., as well as the complex rotaliid genus *Cideina* with orbitoidal character is described, figured and discussed. Key words: Systematic, Foraminifera (Lepidorbitoididae), Maastrichtian, Turkey (Cide, NE of Zonguldak).

INTRODUCTION

In this paper, the stratigraphy of the Cide region (Fig. 1,2) and the description of *Cideina* n. gen. (type species *Cuvillierina sözerii* Sirel, 1973) from the same area have been presented.

The first paleontological study on the larger Upper Cretaceous foraminiferas was carried out by Ami (1932) from the Ereğli region, SW of Zonguldak, W Black Sea. A new species of *Siderolites* as *Siderolites heracleae* was reported by Ami from the Kepesköy tepe, 6 km. east of Ereğli, of the Upper Turonian to Middle Campanian. However, Ami's species could be

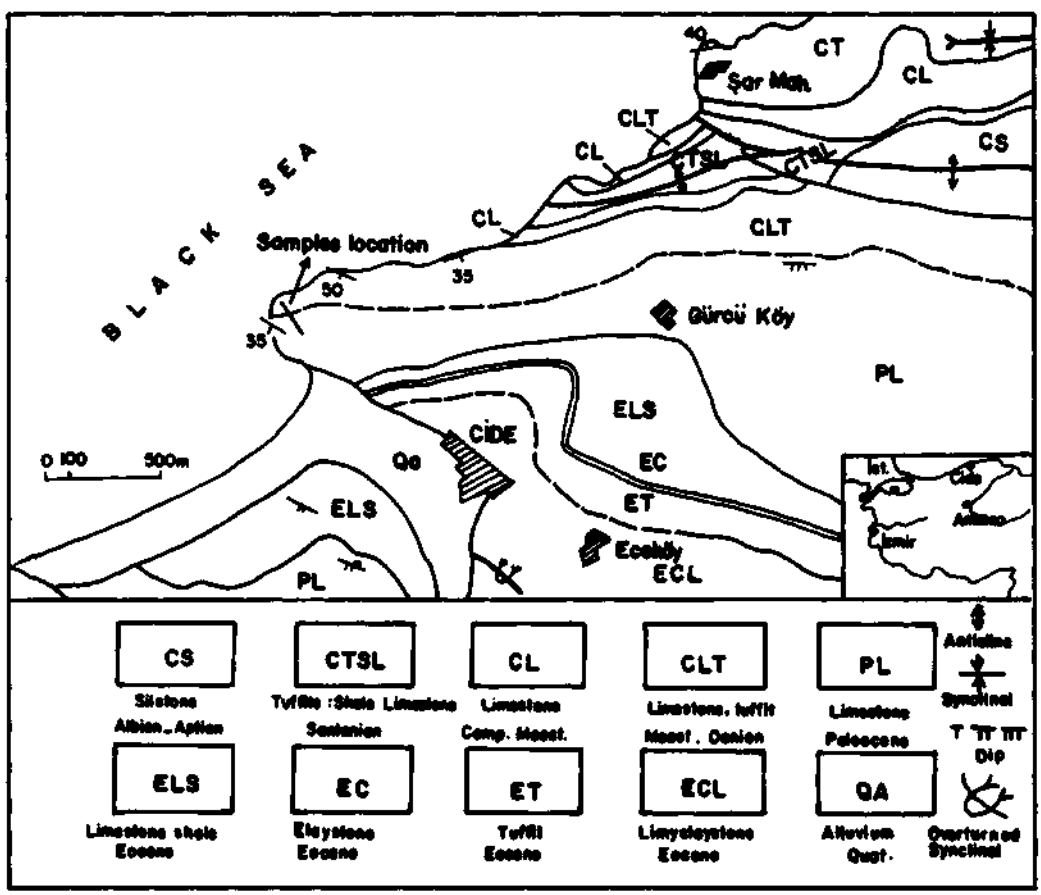

Fig. 1 - Geological map of Cide region (mapped by Ş.Uysal; B.Erdoğan and F.Şaroğlu).

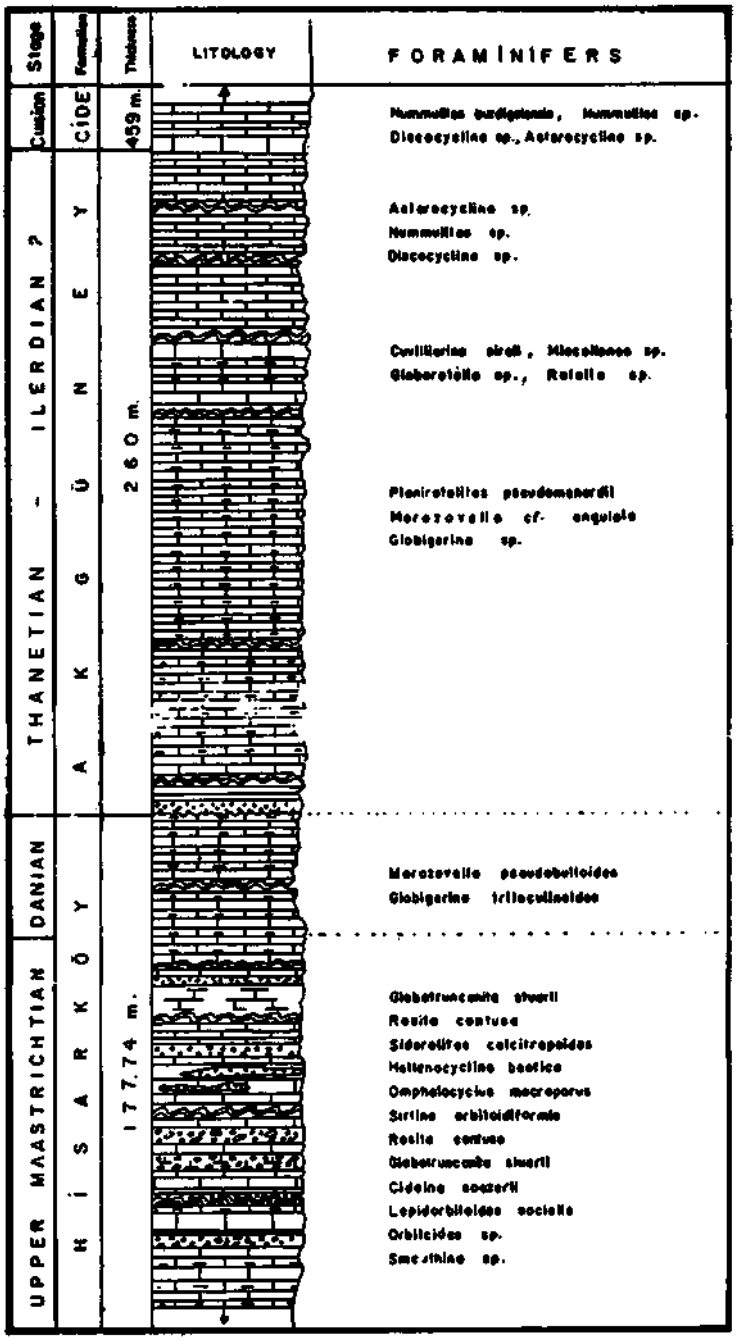

Fig.2- The section measured from the type locality of the *Cideina* n.gen.

identical with *Pseudosiderolites vidali (* Douville). Unfortunately, it was not reported any paleontological study on the larger foraminiferas of the investigated area until 1973. In 1973, the discoidal foraminifera from the Maastrichtian of the Cide region was described and figured as *Cuvillierina sözerii* by Sirel and this species is retained in genus *Cuvillierina* on the basis of its coiling and external omemantation. The recent study on-this discoidal complex foraminifera from the specimens collected from the same locality following second visit by the author, have shown that observed new remarkable orbitoidal characters are present. In the light of the new diagnostic characters, *Cuvillierina sözerii* was transfered to the genus *Cideina* n. gen..

Due to the hardness of the studied samples. It was not possible to obtain free individuals. The present study is based only on selected random thin sections.

All the thin sections bearing this new foraminiferal genus figured in this paper are deposited at the Museum d' Histoire naturelle, Geneva, Switzerland.

STRATIGRAPHY

A project on the Northern Anatolian Fault zone was carried out during 1970-71 by the Geological Mapping Department of the Mineral Research and Exploration Institute of Turkey. The geological map (1:50 000 scale) of the Cide-Kurucas.ile region was made and the several new lithostratigraphic units were established by Akyol et al. (1974) from the West Black Sea region. Mesozoic-Tertiary biostratigraphy of the Cide area was investigated as a part of this project by the present author (Sirel, 1973).

In the Cide region, the following lithostratigraphic units of the Aptian-Albian, Coniacian-Santonian, Campanian-Maastrichtian, Maasthchtian-Danian, Paleocene (Thanetian-Ilerdian?) and Eocene (Cuisian) ages crop out (Fig.l). They were named by Akyol et al (1974).

Ulus **formation** (CS)

This formation is composed of siltstone, alternating sandy shale, rare sandy limestone intercalations near basal parts; alternation of calcareous claystone and sandstone is dominant between Kurucaşile and Cide town. It is very thick, about 3000 m in places. It contains *Hypacanthoplites* aff. *jacobi* (Collet), *Procheloniceras* cf. *amadei (* Hohenegger). Aptian-Albian ages are designated by this fauna.

Kurucaşile formation

This unit is most widespread in the Black Sea region and composed of the following seven members: Çaydere clayey limestone member, Baldıran tuffite member, Songet limestone member, Unaz limestone member, Yeniceköy tuffit member, Cambu agglomerate-lava Member and Kumbos Tuffite-calcareous shale member. The following two members of the Kurucas.ile Fm. crop out in the Cide region.

*Yeniceköy tuffite member (CTSL).*_ Basaltic tuff alternating with tuffite, both gray-green to brown-green; rare intercalations of thinly bedded, light purple, pink, silicified limestone. Thickness varies very much, 780 m. thickness measured. The unit contains *Dicarinella concavata* (Brotzen), *Marginotruncana coranata* (Bolli) designate Coniacian- Santonian.

*Unaz limestone member (CL).*_ This member composed of clayey limestone, mostly pink, rarely green thin bedded; rare intercalations of tuffite and sandstone, avarage thickness of the member is 140 m. From the lower part of the member the following foraminiferas have been obtained indicating Campanian age: *Globolruncanita elevata* (Brotzen) and *Globotruncana linneiana* (d'Otbigny). The upper part of the unit yielded the following globotruncanid species indicating Campanian-Maastrichtian: *Globotruncana area* (Cushman) and *Globolruncana rozetta* (Carsey).

Hisarköy formation (CLT)

The unit is composed of light gray limestone, thick bedded; green and dark red siltstone, thin bedded tuffit intercalations mainly in the upper part; to the eastern part; pebbly appearance due to the large-sized intraclasts; chert nodules in the upper part. The examined limestone with new genus *Cideina* described in this paper yielded the following associations of the foraminifcral species indicating an Upper Maastrichtian age: *Siderolites calcitrapoides* Lamarck, *Sirtina orbitoidiformis* Bronnimann & Wirz, *Omphalocyclus macroporus* (Lamarck), *Hellenocyclina beotica* Reichel, *Lepidorbitoides* sp., *Orbitoides* sp., *Navarella* sp., *Globotruncanita stuarti* (De Lapparent), *Rosita contusa* (Cushman). The formation continues upward conformably with clayey limestone beds containing primitive globorotaliid species : *Morozovella pseudobulloides* (Plummer), *Globigerina triloculinoides* Plummer. According to these foraminiferal species, Danian age has been assumed for the Upper part of the Hisarköy formation.

Akgüney formation (PL)

The formation is composed of thinly bedded clayey limestone intercalations; *Planirotalites pseudomenardii* (Bolli), *Morozovella* cf. *angulata* (White), *Cuvillierina sireli* İnan, *Miscellanea* sp., designate Thanetian age. The following foraminiferal species have been found in the upper part of the formation: *Nummulites* sp., *Discocyclina* sp., according to these species, Ilerdian? age has been assumed for the upper part of the unit. This unit overlies uncomformably Hisarköy formation.

Cide formation (ELS, EC, ET, ECL)

This unit is composed of limestone, shale, claystone, tuffit and limy claystone; *Nummulites burdigalensis* (de la Hame), *Discocyclina* sp. indicate Cuisian age for the unit.

SYSTEMATIC DESCRIPTION

Order : Foraminiferida Eichwald, 1830
Superfamily : Orbitoidacea Schwager, 18/6
Family : Lepidorbitoididae Vaughan, 1933
Genus : *Cideina* n.gen.
Type species : *Cuvillierina. sözerii* Sirel, 1973

Derivation of name: Cide, a town in the west Black Sea region, N Turkey.

Diagnosis : Test large, discoidal to low conical with broadly rounded peripheral margin, small sized spherical protoconch followed by few whorls of trochospirally arranged small chambers of early stage, later nearly planispiral and involute with rapidly expanding whorl, test wall calcareous, finely perforate of radially fibrous calcite during the early ontogeny, being calcareous, coarsely perforate in the late ontogeny; weakly thickened pillars extending from the early chambers to the umbilical side of the test, between pillars there appear to be thin umbilical vertical canals; the dorsal side covered by four, may be more, layers of lateral chambers interspersed by relatively thin pillars, lateral chambers connect with each other by primitive stolons; septal flap well developed and enclosing intraseptal canals, divergent canals and vacuoles present over chambers of outer whorl, dimorphism not observed.

Cideina soezerii (Sirel), 1973

(Plate I, fig. 1-12, Plate II, fig. 1-9)

1973 *Cuvillierina sözerii* Sirel, p. 69, Plate I, fig. 1-6; Plate II, fig. 1-4.

Holotype: Nearly axial section (89-09), illustrated by Plate I, fig. 9.

Depository: Holotype and figured types are deposited at the Museum d'Histoire Naturelle, Geneva, Switzerland.

Material: 52 specimens in random sections, exclusively from the type locality.

Type locality: Cide town, NE of Zonguldak, N Turkey.

Type level: Upper Maastrichtian.

DESCRIPTION

Test is free, discoidal, to low conical; periphery is broadly rounded; the central part of the discoidal shell is slightly inflated compared to the periphery of the test (Plate I, fig. 1, 2, 5, 6, 8, 9). The test wall is calcareous, finely perforated of radially fibrous calcite in early stage, becoming calcareous, coarsely perforated with large vacuoles in the last spiral (Plate I, fig. 1,2, 5, 6, 8, 9,11; Plate n, fig. 1, 5, 7, 8). The superficial sections clearly shows that both sides of the shell are covered by reticulate ornemantations related to divergent canals (Plate I; fig. 12).

Dimensions.- Eight typical specimens have the following measurements.

Table 1

Specimens	*Shape and diameter of proloculus*	*Diameter (mm)*	*Thickness of central part (mm)*	*Thickness of periphery (mm)*	*Diameter of the early stage (mm)*	*Number of the early stage chambers*	*Number of adult chambers*
89-01	-	3.00	0.60	0.38-0.55	1.12	-	-
89-05	-	2.00	0.62	0.42-0.48	0.62	-	-
89-09	-	2.67	0.67	0.40-0.50	0.99	-	-
89-11	-	-	0.73	-	0.65	-	-
89-13	50 µ	1.80	-	-	0.70	24-25	14
89-16	60 µ	3.00	-	-	0.72	23	12
89-17	-	2.05	-	-	0.45	-	13
89-18	25 µ	2.09	-	-	0.85	28-30	-

Internal characters. - In the course of the ontogeny the early involute asymetric spiral (trochospiral coiling) is followed by completely planispiral involute, thickened adult spiral with complex structure related to canal system and vacuoles (Plate I, fig. 1,2, 5, 8, 9,11). The monolocular spheric embryo is enveloped by 23-30 small chambers of the early ontogeny (Plate I, fig. 1-6, 8-11). The weakly thickened conical pillars are extending from the trochospiral chambers to the surface of the test indicating the ventral side of the shell; there are thin vertical canals between the pillars (Plate I, fig.1, 3, 9, 11). The sizes of the trochospiral early chambers gradually increase from the first whorl to the last one (Plate II, fig. 1-8). Later mature chambers are very different in size and shape; they are arranged in completely planispiral involute thickened last spiral (Plate II, fig. 1-8). The last 3-4 adult chambers being very characteristic, become larger and reach to 4-8 times of the sizes of the early chambers (Plate II, fig. 1,4, 5, 8). The spiral thickness begins to increase from the first whorl and reaches its maximum at the last whorl. The thickened last spiral is characterized by the presence of the divergent canals and large vacuoles (Plate I, fig. 1, 3, 8,10; Plate II, fig.1, 3, 5). In the first 1-2 whorls of the early stage, the spire interval gradually increase but, at the last whorl, it suddenly becomes wider as operculinid pattern (Plate II, fig. 1-8). Some equatorial sections of this form (Plate II, fig. 1,4-8) suggest the existence of the septal flap in the adult chambers. A similar septal flap can be observed in *Daviesina tenuis* (Tambareau) (Caus& Hottinger & Tambareau, 1980, fig. A.B.E-G; Plate IV, fig.3,6). The dorsal side of the test is covered by four, may be more, layers of lateral chambers interspersed by relatively thin pillars (Plate I, fig.1,3,5-11). This is a similar corresponding structure in *Sirtina orbitoidiformis* Bronnimann and Wirz, 1952, fig. 4a; the lateral chambers are connected with each other by the primitive stolons. The early and the adult chambers communications are made by a slit form intercameral foramen, at the base of the septum (Plate II, fig. 1,7).

REMARKS

The here described new rotaliid genus with complex structure resembles in some of its internal features orbitoidal foraminiferas: on the dorsal side of *Cideina n.*gen. occur layers of lateral chambers as known from the typical orbitoids, on the other hand, the existence of the early spiral stage with umbilical pillars suggests to the typical rotaliid members. Because of the presence of the rotaliid and orbitoid characters, this new genus has been placed in Lepidorbitoididae Vaughan. However, it will be suitable to establish the new family within the super family *Orbitoidacea* for the genera *Sirtina. Cideina* even *Orbitokathina.*

Rotaliid genus with orbitoidal character, Sırtina was first, described from the Maastrichtian of Iran and Libya by Bronnimann & Wirz (1962). It is spirally arranged rotaliid form with well developed umbilical pillars. Most remarkable is the presence of the orbitoidal lateral chambers on the dorsal side of the shell. *Sırtina,* in which the spire is trochoid in the early stage and planispiral-involute in the adult. This new genus resembles *Sırtina* by its spiral stages and having orbitoidal lateral chambers on the dorsal side. But, *Cideina* n.gen.clearly differs from *Sırtina* in having thickened last spiral with the divergent canals and large vacuoles. In addition, the wall of the last spiral in new genus, is built with coarsely perforated calcite whereas *Sırtina* has finely perforated calcareous wall.

Lenticular rotaliid genus with orbitoidal character, *Arnaudietla* was first described by Douville (1907) from the Campanian of France. This monotypic genus has characteristicly two to five spirally arranged primary chambers, well developed lateral chambers on both sides of the test, no equatorial chambers. Whereas, in the *Cideina* lateral chambers occur on the dorsal side only, and trochospirally arranged primary chambers with pillars arc visible in a short series of 1-2 whorls in the new genus (Plate I, fig. 1, 2, 8, 9,11).

Cideina n.gen. differs from *Cuvillierina* Debourle (1955) in possesing lateral orbitoidal chambers on the dorsal side; in addition, there is superficial differences between the two genera: the external surface of the *Cuvillierina* is covered by reticulate ornamentation with chevron pattern whereas, new genus has irregular reticulate ornamentation on the external surface.

The lenticular, bilaterally symmetrical planispiral enrolled genus *Pseudosiderolites* (type species *Siderolites vidali* Douville) was established by Smout (1955). This genus is abundant arround the type locality of *Cideina* n.gen. and throughout Black Sea region; it occurs in the neritic limestone and associated with *Arnaudiella* sp., *Orbitoides tissoti* Schlumberger and *Helicorbitoides* n.sp.. The new genus *Cideina* is easyly distinguished from the Campanian genus *Pseudosiderolites* by having orbitoidal lateral chambers on the dorsal side of the test.

Stratigraphic occurence. Cideina soezerii occurs in light gray hard limestone near the Cidc town (Fig.l). It is associated with rich foraminiferal species of the Upper Maastrichlian: *Siderolites calcilrapoides, Sırtina orbitoidiformis, Omphalocyclus macroporus, Hellenocyclina beotica, Lepidorbitoides* sp., *Navarella* sp., *Rosila coniusa, Globotruncanita stuarti.*

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PLATES

PLATE -1

Cideina soezerii (Sirel)

Maastrichtian

Cide town, N Turkey

Fig. 1 - Subaxial section (89-01), showing trochospiral stage with pillars and the vacuoles in the last spiral, X29.

Fig. 2 - Axial section (89-02), showing both stage of growth, X26.

Fig. 3 - Subaxial section (89-03), showing layers of lateral chambers on the dorsal side and vacuoles in the last spiral, X31.

Fig. 4 -Oblique section (89-04), inclined to the equatorial plane, X39.

Fig. 5- Subaxial section (89-05) showing both growth stage and lateral chambers, X40.

Fig. 6 - Subaxial section (89-06), X 29.

Fig. 7 - Oblique section (89-07), showing the layers of lateral chambers, X40.

Fig. 8 - Axial section (89-08), slightly oblique, showing both growth stage and lateral chambers, X28.

Fig. 9 - Axial section (89-09) holotype, both growth stage, lateral chambers intersperced thin pillar and vacuoles, X30.

Fig. 10 - Axial section (89-10), slightly oblique, showing lateral chambers intersperced thin pillars, X42.

Fig. 11 - Axial section (89-11), showing involute trochospiral stage with pillars and lateral chambers with basal stolons, X42.

Fig. 12 - Superficial section (89-12), showing irregular reticulate ornemantation and pores, X39.

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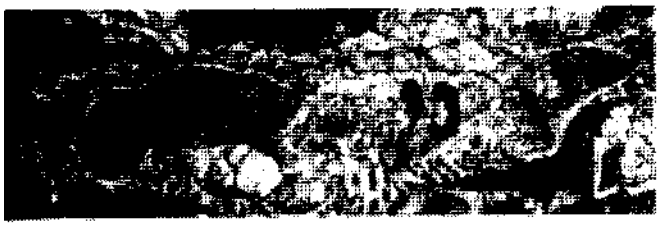

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PLATE - II

Cideina soezerii (Sirel)

Maastrichtian

Cide town, N Turkey

Fig. 1- Equatorial section (89-13), showing vacuoles in the thickened last spiral, X33.

Fig. 2 - Subequatorial section (89-14), slightly oblique, X20.

Fig. 3 - Approximately equatorial section (89-15), X25.

Fig. 4 - Equatorial section (89-16), showing "septal flap"in the last spiral, X26.

Fig. 5 - Equatorial section (89-01), showing large vacuoles and "septal flap", X57.

Fig. 6 - Oblique section (89-13), inclined to equatorial plane, showing "septal flap", X39.

Fig. 7 - Equatorial section (89-17), showing "septal flap"in the last spiral, X36.

Fig. 8 - Incomplete equatorial section (89-18), X27.

Fig. 9 - Oblique section (89-19), inclined to axial plane, X42.

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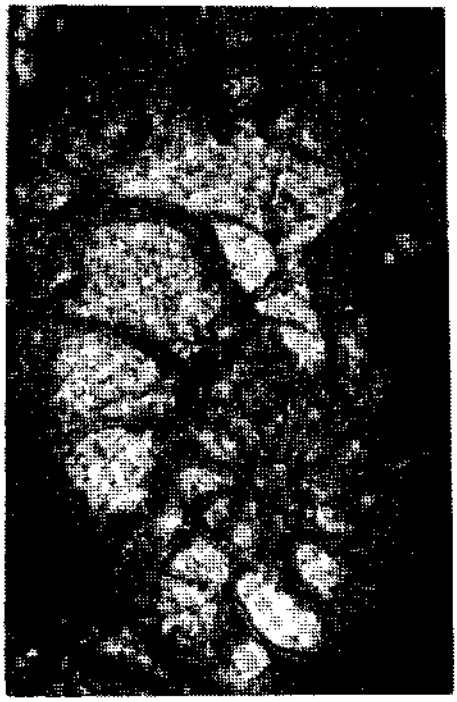

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