

NOREMIA, A NEW MICROFOSSIL GENUS FROM THE HUNGARIAN EOCENE, AND SYSTEMATICAL AND STRATIGRAPHICAL PROBLEMS ABOUT THE CRASSOSPHAERIDAE

(Micropaleontological Investigations in the Basin of Dudar I)

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INTRODUCTION

NOREM's [1955] description of the genus *Tyttthodiscus* has opened a new chapter of micropaleontological investigations. Two species, *T. californiensis* NOREM 1955 and *T. chondrotus* NOREM 1955, are described in his paper. Soon after this publication, the investigations of EISENACK [1957], GOCHT [1959], SOLÉ DE PORTA [1959, 1961], and VENKATACHALA & BALTES [1962] furnished additional data about the new genus. Besides that, GOCHT's paper [1959] is significant because in his opinion *Tasmanites mourai* SOMMER 1956, published by SOMMER [1956], has to be placed into the *Tyttthodiscus* NOREM 1955 genus. GOCHT [1959] put the genus *Tyttthodiscus* NOREM 1955 taxonomically into the *Leiosphaeridae* family, and did not separate it from the *Hystrichosphaeridea*.

COOKSON & MANUM [1960] described the genus *Crassosphaera* with three new species, and discussed in their paper the question of the affinity of the genera *Tyttthodiscus* NOREM 1955 and *Crassosphaera* COOKSON & MANUM 1960. Besides specimens of *Tyttthodiscus* NOREM 1955, VENKATACHALA & BALTES [1962] demonstrated microorganisms, belonging to the *Crassosphaera* genus.

SIMONCSICS & KEDVES [1961] proved *Crassosphaera concinna* COOKSON & MANUM 1960 from the Hungarian Liassic. To mark off *Crassosphaera* from the *Hystrichosphaeridae*, they introduced the new taxon *Crassosphaeridae*. GÓCZÁN, E. KRIVÁN-HUTTER & RÁKOSI reported at the meeting of the Hungarian Geological Society, 14th June 1961, several *Tyttthodiscus* NOREM 1955 and *Crassosphaera* COOKSON & MANUM 1960 species. *Crassosphaera stellulata* COOKSON & MANUM 1960 had been observed in the Lower Eocene, *Crassosphaera concinna* COOKSON & MANUM 1960 in the Middle Oligocene strata. They reported also about the discovery of some new species. E. NAGY gave an (oral) information about having found in the course of her investigations on Oligocene material some specimens of *Crassosphaera concinna* COOKSON & MANUM 1960.

Whilst examining palynologically the Lower Eocene (Sparnat) layers of the basin of Dudar, I observed a number of microfossils which are worth attention. In this paper the results of investigations on the *Crassosphaeridae* are summed up.

RESULTS

Noremia n. gen.

Type: *Noremia major* n. sp.

Description

In surface view circular, flat organisms, originally presumably spherical; the outer surface is adorned with semispherical projections. The organism is surrounded by a thin-walled, veil-like velamen.

Comments: The velamen, and the structure of the wall mark off this specimen from the species of the genera *Tytthodiscus* NOREM 1955 and *Crassosphaera* COOKSON & MANUM 1960.

Noremia major n. sp. (**Plate I, Phot. 1—3**)

Description

In surface view circular, maximal diameter of body 70–120 μ . The velamen of the organism is generally 10–25 μ wide, its wall 0,5–1 μ thick. Outer wall 1–2 μ thick, the projections cover the surface on the whole regularly; they are generally semispherical, seldom continuing in radial tubules; diameter 1–2,5 μ .

Holotype: **Plate I, Phot. 1—3**.

Occurrence: Lower Eocene (Sparnat), basin of Dudar.

In some strata microfossils belonging to *Crassosphaera stellulata* COOKSON & MANUM 1960 occur in larger numbers. However, the characteristics of the observed specimens do not perfectly agree with the description given by COOKSON & MANUM [1960]. So I describe these specimens as a new variation.

Crassosphaera stellulata COOKSON & MANUM 1960 var. minor n. var. (**Plate II, Phot. 1—6**)

Description

On the surface of the microorganism only projections with 5 rays are to be found, projections with 6 rays did not occur. Maximal diameter of the organism 50–70 μ , wall 7–8 μ thick, diameter of projections 2,5–3 μ , height of projections 1,5–2 μ .

Holotype: **Plate II, Phot. 1—6**.

Occurrence: Lower Eocene (Sparnat), basin of Dudar.

Comments: Absence of six-ray projections, smaller dimensions of the body mark off our specimens from the typical form. At present these differences can be regarded only as variations.

DISCUSSION

Because of the morphological characteristics, the new genus can be counted to the *Crassosphaeridae*. Taking into consideration COOKSON & MANUM's [1960] statements, in the present state of our knowledge three new genera can be placed into this category. Considering the characteristic features of these microfossils, in the first place the structure of the wall and the prominences and

projections of the surface, it does not seem practicable to put them into the family *Leiosphaeridae* but rather to discuss them apart from it, and marked off also from the *Hystrichosphaeridae*. This is justified further by the fact that the geneological relations of the *Hystrichosphaeridae* are uncertain (DEFLANDRE [1947], VALENSI [1953], and so the detailed systematical study of the microorganisms the origin of which is not yet known may be the means not only of establishing perspicuity of the known genera but may also contribute to the solving of genealogical problems.

On the basis of the up to now known data, *Crassosphaeridae* can be placed best of all into the system of TIMOFEJEW [1959] in the following way:

- I. fam.: *Leiosphaeridaceae* EISENACK, 1954. emend. TIMOFEJEW 1956
1. subfam.: *Protoleiosphaerideae* TIMOFEJEW 1959
2. subfam.: *Leiosphaerideae* TIMOFEJEW 1959
- II. fam.: *Crassosphaeridae* SIMONCSICS & KÉDVES 1961 emend. here
- III. fam.: *Hystrichosphaeridaceae* O. WETZEL, 1933, emend.
TIMOFEJEW 1956

See the systematical part concerning other paleozoic microfossils in TIMOFEJEW's book [1959], (p. 6).

Accordingly, to the number of families set down by TIMOFEJEW [1959] a new family has been added, and the family *Crassosphaeridae*, so far a taxon, has now a concrete name.

Our systematical knowledge about this family and the up to now known species can be summed up in the following:

Fam.: *Crassosphaeridae*

Flat, in surface view on the whole circular organisms. Originally presumably spherical; their present form may have been caused in the course of fossilization by secondary deformation. Wall generally thick, either segmented or decorated with different prominences or projections, which are often provided with tubules; sometimes a thin-walled velamen covers the organism.

Until now these microfossils have been discovered in marine or brack-water sediments, so they are presumably microorganisms which had been living in more or less salty water. Their closer relation is not yet known but some affinity with *Leiosphaeridae* may be supposed. Based on the available data, these organisms are known since the Jurassic but, taking into consideration SOMMER's [1956] statement and GOCHT's [1959] opinion, they may have occurred as far back as the Paleozoic.

I. Genus: *Tytthodiscus* NOREM 1955

The segmented wall may be acknowledged to be the most characteristic feature of this genus.

- Species: 1. *T. californiensis* NOREM 1955
2. *T. chondrotus* NOREM 1955
3. *T. suevicus* EISENACK 1957

3/a *T. suevicus* EISENACK 1957 var. *macroporus* EISENACK 1957

4. *T. vanderhammeni* SOLÉ DE PORTA 1959

T. chondrotus Norem 1955 shows some morphological connection with *Crassosphaera concinna* COOKSON & MANUM 1960; it may be possibly taken for a transient species. *T. suevicus* EISENACK 1957 var. *macroporus* EISENACK 1957 is in the opinion of EISENACK [1957] presumably a transient form between the genera *Tasmanites* NEWTON 1875 and *Tytrhodiscus* NOREM 1955 (EISENACK [1957]). *Tytrhodiscus* cf. *suevicus* EISENACK, published by GOCHT [1959], is similar to *Crassosphaera stellulata* COOKSON & MANUM 1960, which can be proved in the first place by the radial projections. But the form „*Tytrhodiscus* sp.” may be well fitted in into the genus *Tytrhodiscus* NOREM 1955, as far as can be judged from the drawings and the description. The close relation between the genera *Tytrhodiscus* and *Tasmanites* which GOCHT [1959] definitively states in connection with the species *Tasmanites mourai* SOMMER 1956 needs further investigation.

SOLÉ DE PORTA's [1961] latest data concerning the genus are very interesting and valuable. His investigations on spores and pollen from the coal series of the Lower Tertiary of Montería and Planeta Rica (Colombia) show that they date back to the period between the Lower Oligocene and the Middle Oligocene. Species proved by his investigations are: *Tytrhodiscus chondrotus* NOREM, *Tytrhodiscus* cf. *chondrotus* NOREM, *Tytrhodiscus* cf. *californiensis* NOREM, with two types, (see L. V, fig. 121, resp. 123), and *Tytrhodiscus* sp. It is especially significant that *Tytrhodiscus* cf. *chondrotus* NOREM and *Tytrhodiscus* cf. *californiensis* slightly differ from the type published by NOREM [1955], in the first place by their dimensions. This may be due to geographical or time differences but is also possible that the investigated specimens had been organisms, standing at the beginning of evolution, and possessing great ability to assume different forms.

II. Genus: *Crassosphaera* COOKSON & MANUM 1960.

The species of the genus are well characterized by the surface prominences, resp. projections which continue in radial tubules.

Species:

1. *Cr. concinna* COOKSON & MANUM 1960

2. *Cr. digitata* COOKSON & MANUM 1960

3. *Cr. stellulata* COOKSON & MANUM 1960

3/a. *Cr. stellulata* COOKSON & MANUM 1960 var. *minor* n. var.

III. Genus: *Noremia* n. gen.

Characteristic features of the genus may be termed the veil-like velamen covering the organism, and the projections on the surface.

1. *N. major* n. sp.

A summary of the *Tytrhodiscus* species from stratigraphical viewpoint was given first by WALOWEEK & NOREM [1957], then by SOLÉ DE PORTA [1959]. Taking into account the latest data, I have shown the distribution

of the at present known *Crassosphaeridae* in the geological periods in the following table.

		<i>Tyttthodiscus suevicus</i> EISENACK 1957	<i>Crassosphaera concinna</i> COOKSON & MANUM 1960	<i>Crassosphaera digitata</i> COOKSON & MANUM 1960	<i>Tyttthodiscus cf. suevicus</i> EIS. GOCHT 1959	<i>Crassosphaera stellulata</i> COOKSON & MANUM 1960 var. minor n. var.	<i>Noremia major</i> n. gen. et n. sp.	<i>Crassosphaera stellulata</i> COOKSON & MANUM 1960	<i>Tyttthodiscus vanderhameni</i> SOLÉ DE PORTA 1959	<i>Tyttthodiscus chondrotus</i> NOREM 1955	<i>Tyttthodiscus californiensis</i> NOREM 1955
Pliocene	L.										
	U.										+
Miocene	U.										
	M.									+	+
	L.										
Oligocene	U.							+			
	M.		+						+	+	+
	L.										
Eocene	U.								+		
	M.							+			+
	L.		+			+	+				
Cretaceous	U.										
	L.		+	+	+						
Jurassic	U.										
	M.										
	L.	+	+								

Based on the reported data, the following problems arise:

1. The question about the stratigraphical value of the individual species; concretely e. g. Does *Tyttthodiscus suevicus* EISENACK 1957 occur only in the Liassic? Is this species characteristic for this period?

2. The problem of the species which show considerably wide stratigraphic distribution, e. g. the Spitsbergen specimens and the Australian *Crassosphaera concinna* COOKSON & MANUM 1960. COOKSON & MANUM [1960] have stated that these species are to a certain degree different. Similarly, the Hungarian Liassic species show also some morphological peculiarities; the forms observed by GÓCZÁN, E. KRIVÁN—HUTTER & RÁKOSI, resp. E. NAGY can also not be perfectly identified with any form discussed above. It is worth attention that, similar to SOLÉ DE PORTA's [1961] *Tyttthodiscus cf. chondrotus* NOREM and *Tyttthodiscus cf. californiensis* NOREM, the species from the Liassic of Urkut, those from the Neocomian of Komewu, Papua, New-Guinea, the specimens from the Lower Tertiary of Westspitsbergen and of the Oligocene of Hungary show also morphological differences, which might have been caused either by time or by geographical differences. If further results show that these differences are due to time differences, we shall be able to establish a nice series of evolution. On the other hand, if the cause should prove to be

geographical isolation, data about paleoecological conditions would be obtainable.

Crassosphaera stellulata COOKSON & MANUM 1960 may also be investigated from this point of view. COOKSON & MANUM [1960] consider the form, named by GOCHT [1959] *Tyttodiscus cf. suevicus* EISENACK, as belonging to the *Crassosphaera stellulata* COOKSON & MANUM 1960 form, which is made plausible by the above mentioned projections. It may be supposed that the microfossil *Tyttodiscus cf. suevicus* EISENACK of the Lower Cretaceous was an early, more primitive form of the better developed *Crassosphaera stellulata* COOKSON & MANUM 1960 from the Eocene. So this form is also to be counted to the *Crassosphaera* genus, and its place in systematic has to be defined. But within the limits of this paper it cannot be done. In addition, the stratigraphic and geographic value of the new variant discussed within the range of this genus has to be made clear by further data.

It is evident that these questions cannot be answered satisfactorily at the present moment. But we hope that based on the quickly increasing number of data we shall soon be able to solve these problems. Undoubtedly, further micropaleontological and palynological investigations on these significant organisms will help us to find an answer to the problems of stratigraphy.

SUMMARY

1. From the Lower Eocene strata of the basin of Dudar the taxons *Noremia major* n. gen. et n. sp., and *Crassosphaera stellulata* COOKSON & MANUM 1960 var. minor n. var. are described.

2. The taxon *Crassosphaeridae* can be placed as a new family into TIMOFEJEV's [1959] system between the families *Leiosphaeridaceae* and *Hystri-chosphaeridaceae*.

3. After a short characterization of the family the up to now known species are described in the systematical part; geographical, resp. stratigraphical problems concerning morphological differences between some of the long living species are discussed.

ACKNOWLEDGEMENTS

I am greatly indebted to DR. S. MANUM (Inst. of Geology, Blindern, Oslo), to DR. W. L. NOREM (Richfield Oil Corporation, California), and to DR. L. RÁKOSI (Dunántúli Kutató-fúró Vállalat Központi Anyagvizsgáló és Anyagfeldolgozó Laboratórium) for their valuable help and advice.

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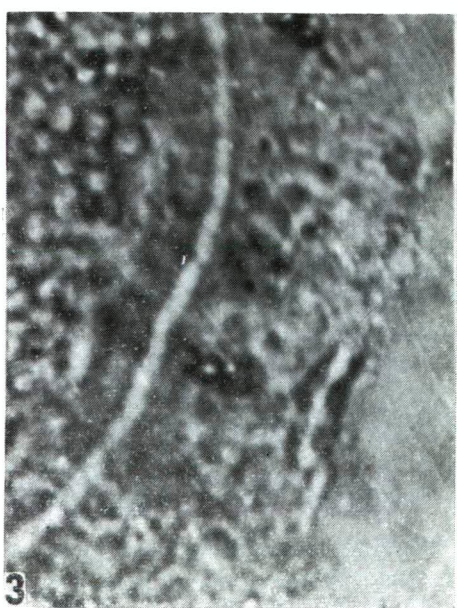
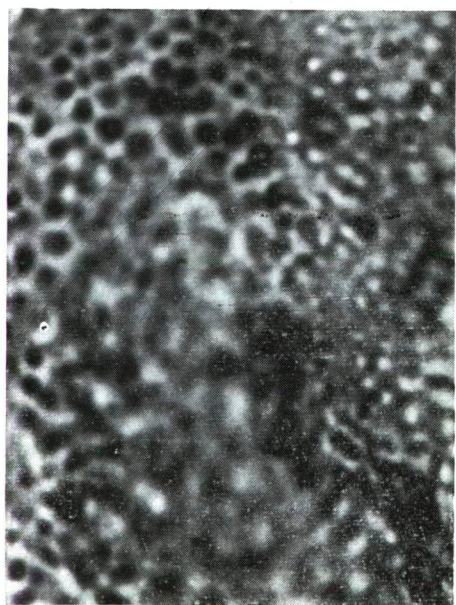
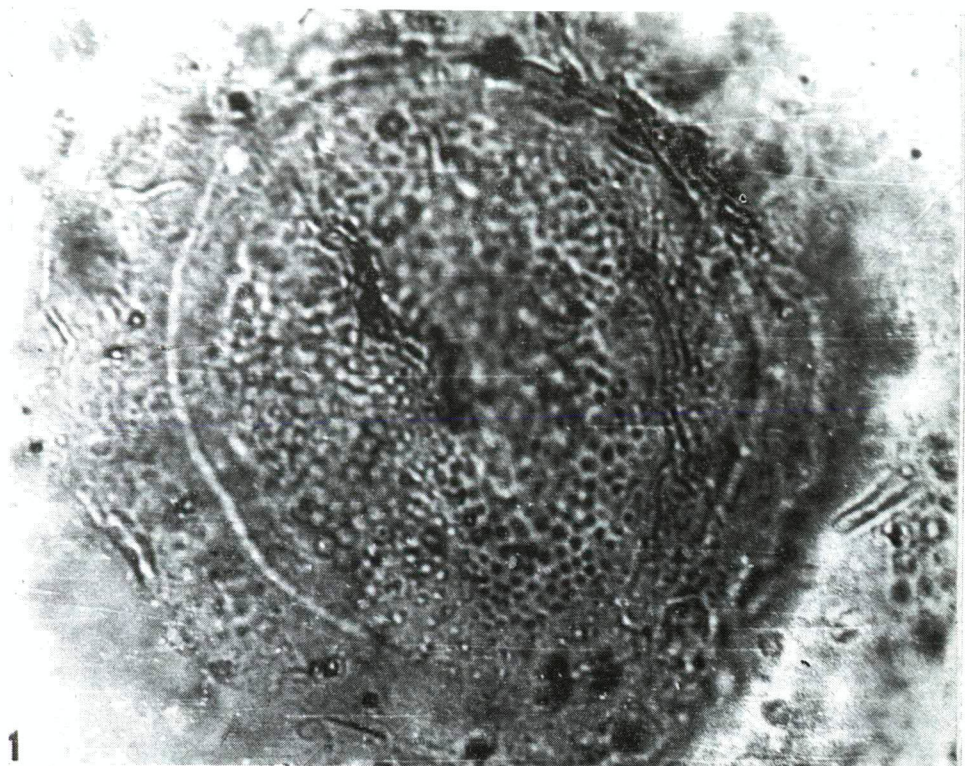


Table I

Phot. 1 *Noremia major* n. gen. et sp. ($\times 1000$)
Phot. 2, 3 *Noremia major* n. gen. et sp. ($\times 2000$)

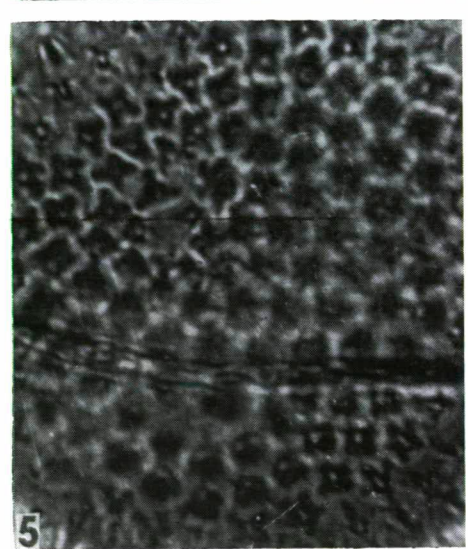
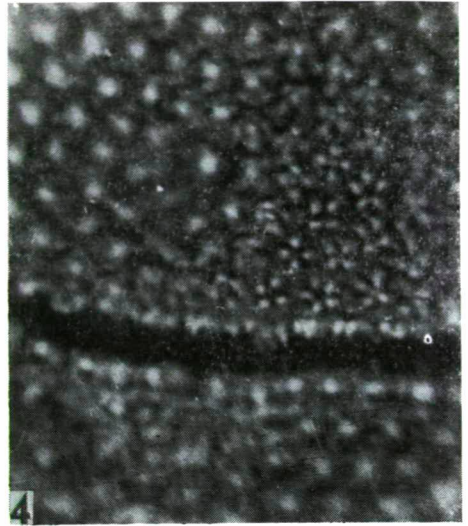
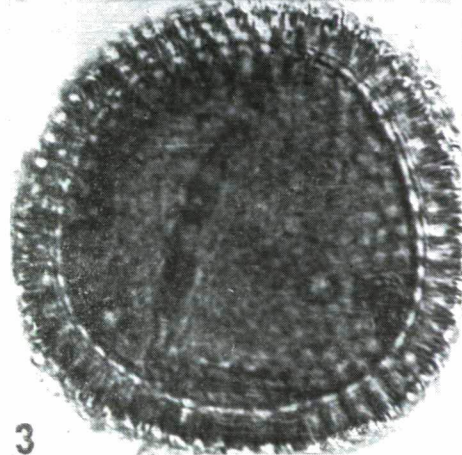
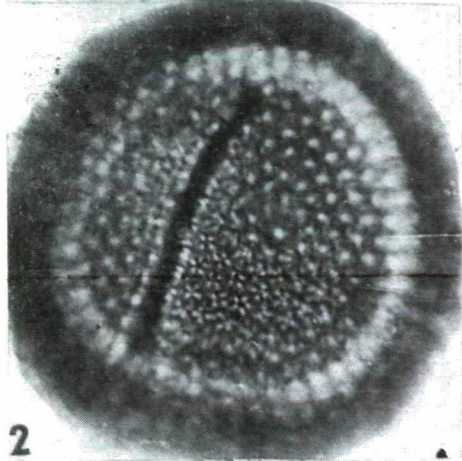
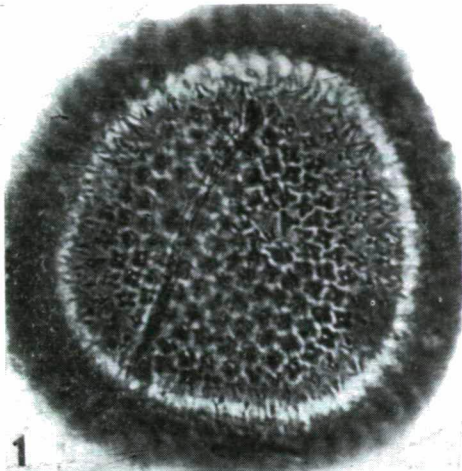


Table II

Phot. 1—3 *Crasso phaera stellulata* COOKSON & MANUM 1957 var. minor n. var. ($\times 1000$)
Phot. 4—6 *Crasso phaera stellulata* COOKSON & MANUM 1960 var. minor n. var. ($\times 2000$)

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