

### 3. PLANT MICROFOSSILS FROM THE UPPER CRETACEOUS AND LOWER TERTIARY LAYERS OF NORTHERN SPAIN I.

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#### Abstract

The spore-pollen assemblages of two localities of the Upper Cretaceous layers from Northern Spain are presented in this contribution. In the sample of the Zambrana section (30 km South of Miranda de Ebro) the *gymnospermous Classoidites glandis* occurs in a dominant quantity with a large number of early *Brevaxonate* pollen grains: *Atlantopollis* and *Complexiopollis* fssp. This is similar to the spore-pollen assemblage isolated from Oviedo (SOLÉ DE PORTA, 1978) and to those of Fermetelos, Oia, etc. from Portugal (KEDVES and PÁRDUTZ, 1983). As for their geological age, the Lower Turonian seems to be probable. The spore-pollen assemblage of the Sobron section (80 km North-West of Burgos) is quite different. Dominant forms are the disaccate *gymnosperm* pollen grains. The quantity of the evolved early *Brevaxonate* pollen grains (*Eunormapollis*: *Papillopollis*, *Interporopollenites*, *Verruculopollis*, *Endopollis*, *Krutzschipollis*, etc.) and that of the *Postnormapollis* is relatively large. A similar palynomorph assemblage was described from Guadalix (MÉDUS and ALVAREZ RAMIS, 1989), its geological age is probably Santonian.

*Key words:* Palynology, fossil, Upper Cretaceous, Spain.

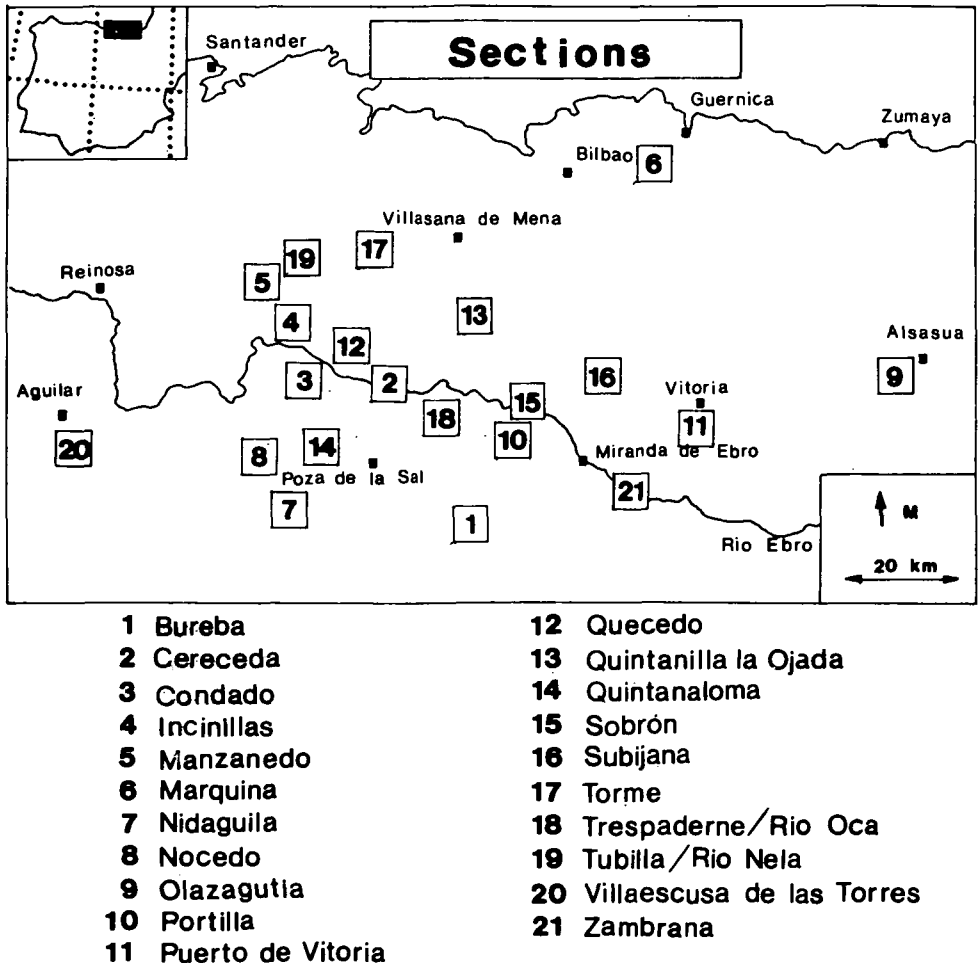
#### Introduction

There are several publications concerning the spore-pollen assemblages of the Upper Cretaceous sediments of Spain. On the basis of the different concepts of these researches the following, previously published papers may be mentioned:

1. Description of basic plant microfossil remains. AMEROM (1965, Cenomanian-Turonian of the Province of León, Northern Spain), SOLÉ DE PORTA (1978, Cenomanian from Los Alrededores de Oviedo), ALVAREZ RAMIS (1985, El Vellón, Madrid), PORTA, KEDVES, SOLÉ DE PORTA and CIVIS (1985, Maastrichtian of Barranco de La Posa, Lérida), ALVAREZ RAMIS, CLEMENTE BELMONTE, FERNÁNDEZ MARRÓN, GALÁN RUIZ and GÓMEZ PORTER (1987, El Vellón, Madrid), MÉDUS (1987, Campanian from Cedano, N. of Burgos), MÉDUS and ALVAREZ RAMIS (1989, Senonian from Guadalix of the Province of Madrid), ALVAREZ RAMIS and DOUBINGER (1980, Torrelaguna, Madrid).
2. Comparative investigations; Northern Spain with the Southern part of France; MÉDUS (1970a,b, 1972, 1975, 1978).

3. Paleophytogeography concerning the Mediterranean Region including the Iberian Peninsula: KRUTZSCH (1967, in: GÓCZÁN, GROOT, KRUTZSCH and PAČLOVÁ), KEDVES and DINIZ (1983), KEDVES (1985).

4. Investigation of the in situ pollen grains from Upper Cretaceous sediments of Spain; ALVAREZ RAMIS (1980, 1981), ALVAREZ RAMIS and FERNÁNDEZ MARRÓN (1986), ALVAREZ RAMIS, BARALE and FERNÁNDEZ MARRÓN (1987) BARALE, FERNÁNDEZ MARRÓN and ALVAREZ RAMIS (1988).



Text-fig. 3.1.

Schematic map of the sampling localities following MARTINS.

## Materials and Methods

Dr. ULRICH P. MARTINS (Department of Geology and Paleontology of the University of Tübingen, R. F. Germany) have sent me slides for palynological investigations. The materials of investigations may be divided into two groups. This paper deals with the spore-pollen assemblages of the lower two levels. On the basis of the letter of Dr. U. P. MARTINS dated on 3. 5. 1987, the data of the marlstone samples are the following. Sample 194/10 (2 slides) came from the Sobron Section, 80 km North-West of Burgos, approximately Lower Santonian in age.

Sample 268/14 (4 slides) originates from the Zambrana Section, 30 km South of Miranda de Ebro, same age. The treatment of the samples started with HNO<sub>3</sub> (65%).

The localities of the sampling by Dr. U. P. MARTINS are illustrated on text-fig. 3.1. (cf. MARTINS 1988, 1989). The stratigraphic column of Quintanilla la Ojada – Losa Valley – (Text-fig. 3.2.) illustrates the stratigraphic situations of the samples under palynological investigation. On the basis of the preliminary studies, the two levels presented in this contribution represents the oldest part of the Upper Cretaceous in this region. For the first step the spore-pollen assemblages are elaborated, the *Acritarchs* will be the subjects of further investigations.

## Results

### 1. ZAMBRANA SECTION (30 KM SOUTH OF MIRANDA DE EBRO)

No: 268/14

#### Quantitative data

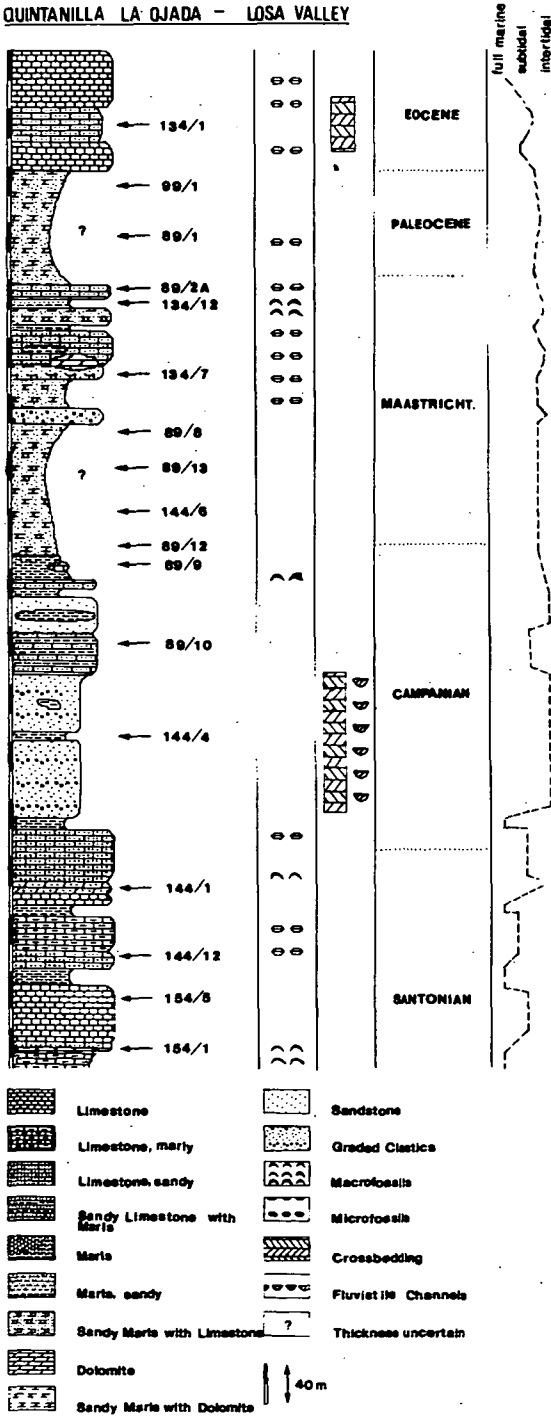
	No of specimens
<i>Hystriosphæridae</i>	196
<i>Sporites</i>	7
<i>Disaccites</i>	8
<i>Classoidites</i>	57
<i>Atlantopollis</i>	43
<i>Complexiopollis</i>	17

#### Qualitative data

##### Sporites

*Stereisporites aegypticus* KEDVES 1986, *Sphagnaceae* (Plate 3.1., figs. 1,2),  
*Ischiosporites* cf. *tuberosus* DÖRING 1965 (Plate 3.1., figs. 10,11),  
*Ischiosporites* cf. *pseudoreticulatus* (COUPER 1958) DÖRING 1965 (Plate 3.1., fig. 12),  
*Cicatricosisporites baconicus* H. DEÁK 1963, *Schizaeaceae* (Plate 3.1., fig. 3),  
*Appendicisporites potomacensis* BRENNER 1963, *Schizaeaceae* (Plate 3.1., fig. 4),  
Cf. *Clavatisporites* fsp. (Plate 3.1., fig. 5),

QUINTANILLA LA OJADA - LOSA VALLEY



◀ Text-fig. 3.2.

Stratigraphical column of Quintanilla La Ojada - Losa Valley and the position of the samples which are the subjects of this research program. Schema following MARTINS.

*Liburnisporites* fsp. (Plate 3.1., figs. 6,7),  
*Uvaesporites* cf. *neerlandicus* HERNGREEN, FELDER, KEDVES and MEESSEN 1986 (Plate 3.1., fig. 13),  
*Camarozonosporites insignis* NORRIS 1967, *Lycopodiaceae* (Plate 3.1., figs. 8,9).

#### Pollenites

*Podocarpidites multesimus* (BOLKHOVITINA 1956) POCOCK 1962 (Plate 3.1., figs. 14,15),  
*Classoidites glandis* AMEROM 1965 (Plate 3.1., figs. 16,17),  
*Atlantopollis microreticulatus* KRUTZSCH 1967 (Plate 3.1., figs. 18,19),  
*Atlantopollis vilaflorensis* KEDVES and DINIZ 1979 (Plate 3.1., figs. 20,21),  
*Atlantopollis grooti* KEDVES and DINIZ 1979 (Plate 3.1., figs. 22,23),  
*Atlantopollis choffatii* DINIZ, KEDVES and SIMONCSICS 1974 (Plate 3.1., fig. 24),  
*Complexiopollis praeatumescens* KRUTZSCH 1959 (Plate 3.1., figs. 25–28),  
*Complexiopollis vulgaris* (GROOT and GROOT 1962) GROOT and KRUTZSCH 1967 (Plate 3.1., figs. 29,30),  
*Complexiopollis subtilis* (KRUTZSCH 1959) KRUTZSCH 1967 (Plate 3.1., figs. 31,32),  
*Complexiopollis latis* (KRUTZSCH 1959) KRUTZSCH 1967 (Plate 3.1., figs. 33,34).

## 2. SOBRON SECTION (80 KM. NORTH-WEST OF BURGOS)

No: 194/10

#### Quantitative data

	No of specimens
<i>Hystrichosphaeridae</i>	124
<i>Dissaccites</i>	89
<i>Classoidites</i>	2
<i>Longaxones</i>	3
<i>Eunormapolles</i>	52
<i>Postnormapolles</i>	6

#### Qualitative data

##### Pollenites

*Pinuspollenites spherisaccus* BRENNER 1963 (Plate 3.2., figs. 1,2),  
*Podocarpidites verruculatus* (TREVISAN 1967) KRUTZSCH 1971 (Plate 3.2., figs. 3,4),  
*Retitricolpites minutus* (BRENNER 1963) DETTMANN 1973 (Plate 3.2., figs. 5,6),  
*Ilexpollenites erdtmani* KEDVES 1978, *Aquifoliaceae* (Plate 3.2., figs. 7,8),  
*Complexiopollis* cf. *patulus* TSCHUDY 1973 (Plate 3.3., figs. 31,32),  
*Verruculopollis* fsp. (Plate 3.2., figs. 9,10),  
*Endopollis* fsp. (Plate 3.2., figs. 11,12),  
*Krutzschipollis spatiosus* GÓCZÁN (Plate 3.2., figs. 13,14),

*Semioculopollis medius* KEDVES and DINIZ 1983 (Plate 3.2., figs. 15,16),  
*Papillopollis* fsp. (Plate 3.2., figs. 17,18),  
*Papillopollis pflugii* KEDVES and PITTAU 1979 (Plate 3.3., figs. 1,2),  
*Papillopollis vancampoae* KEDVES and PITTAU 1979 (Plate 3.3., figs. 3–6),  
*Papillopollis rugulatus* KEDVES and PITTAU 1979 (Plate 3.3., figs. 7,8),  
*Papillopollis regulus* PFLUG 1953 (Plate 3.3., figs. 9,10),  
*Rocheipollenites triangulus* KEDVES and DINIZ 1980 (Plate 3.3., figs. 11,12),  
*Triangulipollis* cf. *magnus* KEDVES and DINIZ 1980–1981 (Plate 3.3., figs. 15,16),  
*Interporopollenites plicatus* KEDVES and HEGEDÜS 1975 (Plate 3.3., figs. 13,14,17,18),  
*Interporopollenites stanley* KEDVES and HEGEDÜS 1975 (Plate 3.3., figs. 19,20),  
*Interporopollenites concavus* KEDVES and HEGEDÜS 1975 (Plate 3.3., figs. 21,22),  
*Interporopollenites dinizae* KEDVES and HEGEDÜS 1975 (Plate 3.3., figs. 23,24),  
*Interporopollenites ornatus* KEDVES and HEGEDÜS 1975 (Plate 3.3., figs. 25,26),  
*Alnipollenites* fsp. (Plate 3.3., figs. 27,28),  
*Triporopollenites nointelensis* KEDVES 1970, *Corylaceae*, (Plate 3.3., figs. 29,30),  
*Triatriopollenites lubomirovae* (GLADKOVA 1965) KEDVES 1974, *Myricaceae* (Plate 3.3.,  
 figs. 31,32),  
*Inaperturopollenites lacunosus* VAN HOEKEN-KLINKENBERG 1964 (Plate 3.3., figs.  
 33,34).

### Discussion and Conclusions

1. The large quantity of the planctonic organisms in both assemblages need further investigations in the future.
2. The spore-pollen assemblage of the Zambrana section is a very good basis of comparison for the lower part of the Upper Cretaceous spore-pollen assemblages in Northern Spain. This can be characterized with the early *Normapolles* genera, *Atlantopollis* and *Complexiopollis*. The lack of the *Probrevaxones*, and the fact, that during my investigation *Longaxones* pollen grains were not observed is worth mentioning. Obviously, further investigations will probably enrich our knowledge of this matter. This assemblage may be compared to further European localities in the boreal region, too; cf. KRUTZSCH 1967, in GÓCZÁN, GROOT, KRUTZSCH and PAČLTOVÁ.
3. The spore-pollen assemblage of the Sobron locality is much younger, with no intermediate assemblages till this time. This is similar to the Upper Cretaceous spore-pollen assemblages from Portugal. Until this time we have been able to use the so-called Aveiro type from Portugal for comparison, but further investigations are necessary needed.

### Acknowledgements

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Plate 3.1.

- 1,2. *Stereisporites aegypticus* KEDVES 1986, *Sphagnaceae*, slide: 268/14-1, cross-table number: 8.8/135.3.
3. *Cicatricosisporites baconicus* H. DEÁK 1963, *Schizaeaceae*, slide: 268/14-4, cross-table number: 10.5/135.8.
4. *Appendicisporites potomacensis* BRENNER 1963, *Schizaeaceae*, slide: 268/14-3, cross-table number: 10.3/138.8.
5. Cf. *Clavatisporites* sp., slide: 268/14-3, cross-table number: 26.2/130.1.
- 6,7. *Liburnisporites* sp., slide: 268/14-1, cross-table number: 8.4/131.6.
- 8,9. *Camarozonosporites insignis* NORRIS 1967, *Lycopodiaceae*, slide: 268/14-3, cross-table number: 10.9/143.6.
- 10,11. *Ischiosporites* sp. cf. *tuberosus* DÖRING 1965, slide: 268/14-2, cross-table number: 6.5/127.6.
12. *Ischiosporites* cf. *pseudoreticulatus* (COUPER 1958) DÖRING 1965, slide: 268/14-1, cross-table number: 13.4/127.4.
13. *Uvaesporites* cf. *neerlandicus* HERNGREEN, FELDER, KEDVES and MEESEN 1986, slide: 268/14-4, cross-table number: 11.5/134.8.
- 14,15. *Podocarpidites multesimus* (BOLKHOVITINA 1956) POCOCK 1962, slide: 268/14-3, cross-table number: 8.6/130.6.
- 16,17. *Classoidites glandis* AMEROM 1965, slide: 268/14-3, cross-table number: 8.3/129.4.
- 18,19. *Atlantopollis microreticulatus* KRUTZSCH 1967, slide: 268/14-3, cross-table number: 8.3/129.4.
- 20,21. *Atlantopollis vilaflorensis* KEDVES and DINIZ 1979, slide: 268/14-2, cross-table number: 24.2/131.8.
- 22,23. *Atlantopollis grooti* KEDVES and DINIZ 1979, slide: 268/14-1, cross-table number: 15.6/141.7.
24. *Atlantopollis choffatii* DINIZ, KEDVES and SIMONCSICS 1974, slide: 268/14-1, cross-table number: 7.4/137.2.
- 25,26. *Complexiopollis praeatumescens* KRUTZSCH 1959, slide: 268/14-3, cross-table number: 9.8/139.1.
- 27,28. *Complexiopollis praeatumescens* KRUTZSCH 1959, slide: 268/14-4, cross-table number: 17.3/127.4.
- 29,30. *Complexiopollis vulgaris* (GROOT and GROOT 1962) GROOT and KRUTZSCH 1967, slide: 268/14-1, cross-table number: 20.4/143.8.
- 31,32. *Complexiopollis turonis* (KRUTZSCH 1959) KRUTZSCH 1967, slide: 268/14-2, cross-table number: 20.2/121.8.
- 33,34. *Complexiopollis latis* (KRUTZSCH 1959) KRUTZSCH 1967, slide: 268/14-1, cross-table number: 21.3/128.9.

Plate 3.2.

- 1,2. *Pinuspollenites spherisaccus* BRENNER 1963, slide: 194/10-2, cross-table number: 6.7/127.1.
- 3,4. *Podocarpidites verrucatus* (TREVISAN 1967) KRUTZSCH 1971, *Podocarpaceae*, slide: 194/10-1, cross-table number: 10.3/135.3.
- 5,6. *Retitricolpites minutus* (BRENNER 1963) DETTMANN 1973, slide: 194/10-1, cross-table number: 19.9/130.3.
- 7,8. *Ilexpollenites erdmani* KEDVES 1978, *Aquifoliaceae*, slide: 194/10-1, cross-table number: 6.8/138.7.
- 9,10. *Verruculopollis* sp., slide: 194/10-1, cross-table number: 8.3/130.7.
- 11,12. *Endopollis* sp., slide: 194/10-2, cross-table number: 20.2/125.9.

- 13,14. *Kruzschipollis spatiosus* GÓCZÁN 1967, slide: 194/10-1, cross-table number: 11.2/127.4.  
 15,16. *Semioculopollis medius* KEDVES and DINIZ 1983, slide: 194/10-1, cross-table number: 10.3/130.3.  
 17,18. *Papillopollis* fsp., slide: 194/10-2, cross-table number: 18.2/127.2.

Plate 3.3.

- 1,2. *Papillopollis pflugii* KEDVES and PITTAU 1979, slide: 194/10-2, cross-table number: 12.9/129.3.  
 3,4. *Papillopollis vancampoae* KEDVES and PITTAU 1979, slide: 194/10-2, cross-table number: 22.2/140.8.  
 5,6. *Papillopollis vancampoae* KEDVES and PITTAU 1979, slide: 194/10-1, cross-table number: 18.4/135.2.  
 7,8. *Papillopollis rugulatus* KEDVES and PITTAU 1979, slide: 194/10-1, cross-table number: 6.8/136.9.  
 9,10. *Papillopollis regulus* PFLUG 1953, slide: 194/10-1, cross-table number: 17.7/130.9.  
 11,12. *Rocheipollenites triangulus* KEDVES and DINIZ 1980, slide: 194/10-2, cross-table number: 9.3/131.6.  
 13,14. *Interporopollenites plicatus* KEDVES and HEGEDŰS 1975, slide: 194/10-2, cross-table number: 21.2/128.9.  
 15,16. *Triangulipollis* cf. *magnus* KEDVES and DINIZ 1980–1981, slide: 194/10-2, cross-table number: 8.3/129.9.  
 17,18. *Interporopollenites plicatus* KEDVES and HEGEDŰS 1975, slide: 194/10-1, cross-table number: 9.2/129.3.  
 19,20. *Interporopollenites stanley* KEDVES and HEGEDŰS 1975, slide: 194/10-1, cross-table number: 20.8/136.5.  
 21,22. *Interporopollenites concavus* KEDVES and HEGEDŰS 1975, slide: 194/10-2, cross-table number: 24.3/123.4.  
 23,24. *Interporopollenites dinizae* KEDVES and HEGEDŰS 1975, slide: 194/10-1, cross-table number: 16.3/140.6.  
 25,26. *Interporopollenites ornatus* KEDVES and HEGEDŰS 1975, slide: 194/10-2, cross-table number: 22.3/134.2.  
 27,28. *Alnipollenites* fsp., slide: 194/10-1, cross-table number: 16.5/142.2.  
 29,30. *Triporopollenites nointelensis* KEDVES 1970, *Corylaceae*, slide: 194/10-1, cross-table number: 12.2/136.1.  
 31,32. *Triatrioporopollenites lubomirovae* (GLADKOVA 1965) KEDVES 1974, *Myricaceae*, slide: 194/10-2, cross-table number: 9.9/136.9.  
 \* *Complexiopollis* cf. *paulus* TSCHUDY 1973.  
 33,34. *Inaperturotetradites lacunosus* VAN HOEKEN-KLINKENBERG 1964, slide: 194/10-2, cross-table number: 17.6/141.6.

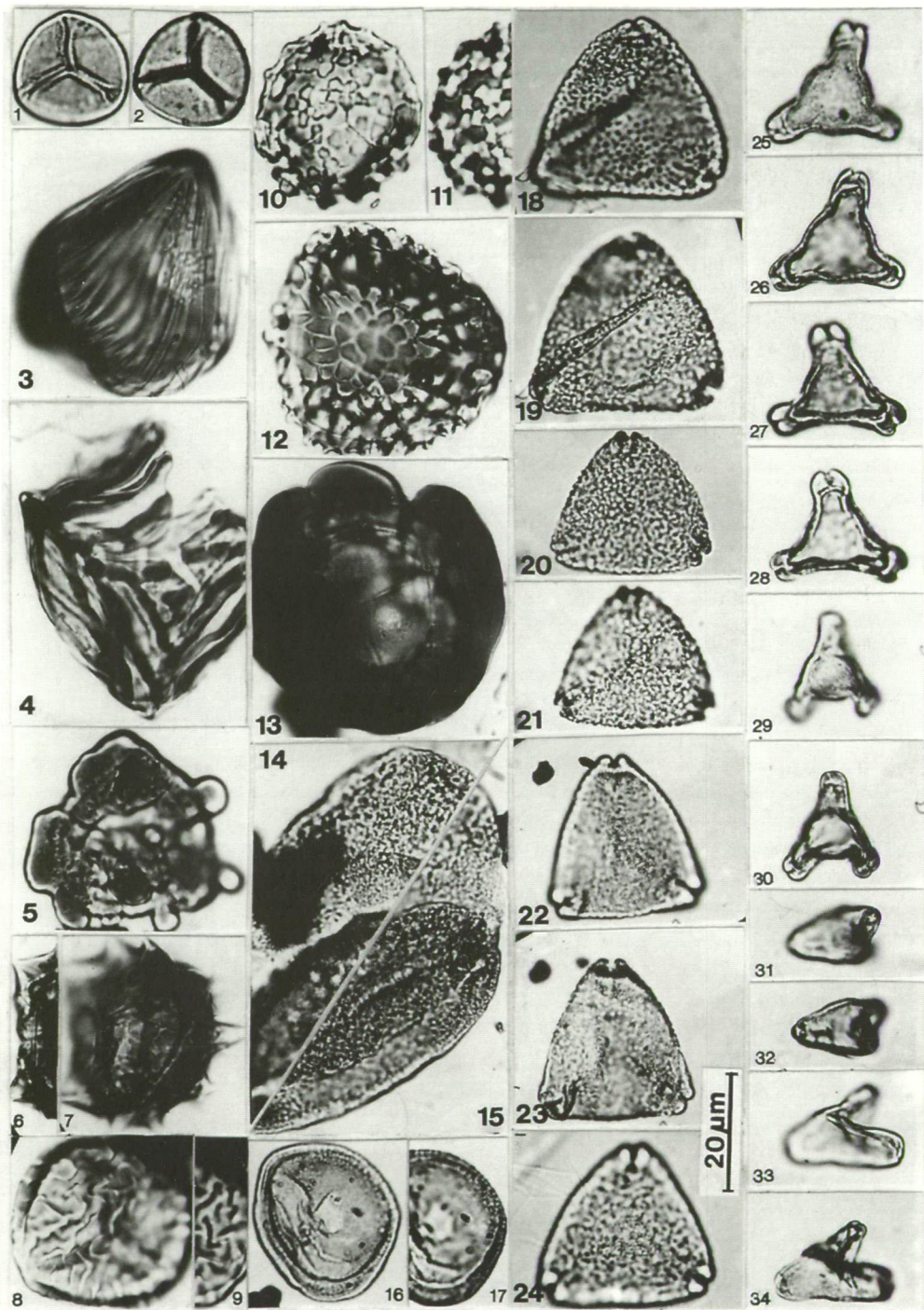


Plate 3.1.

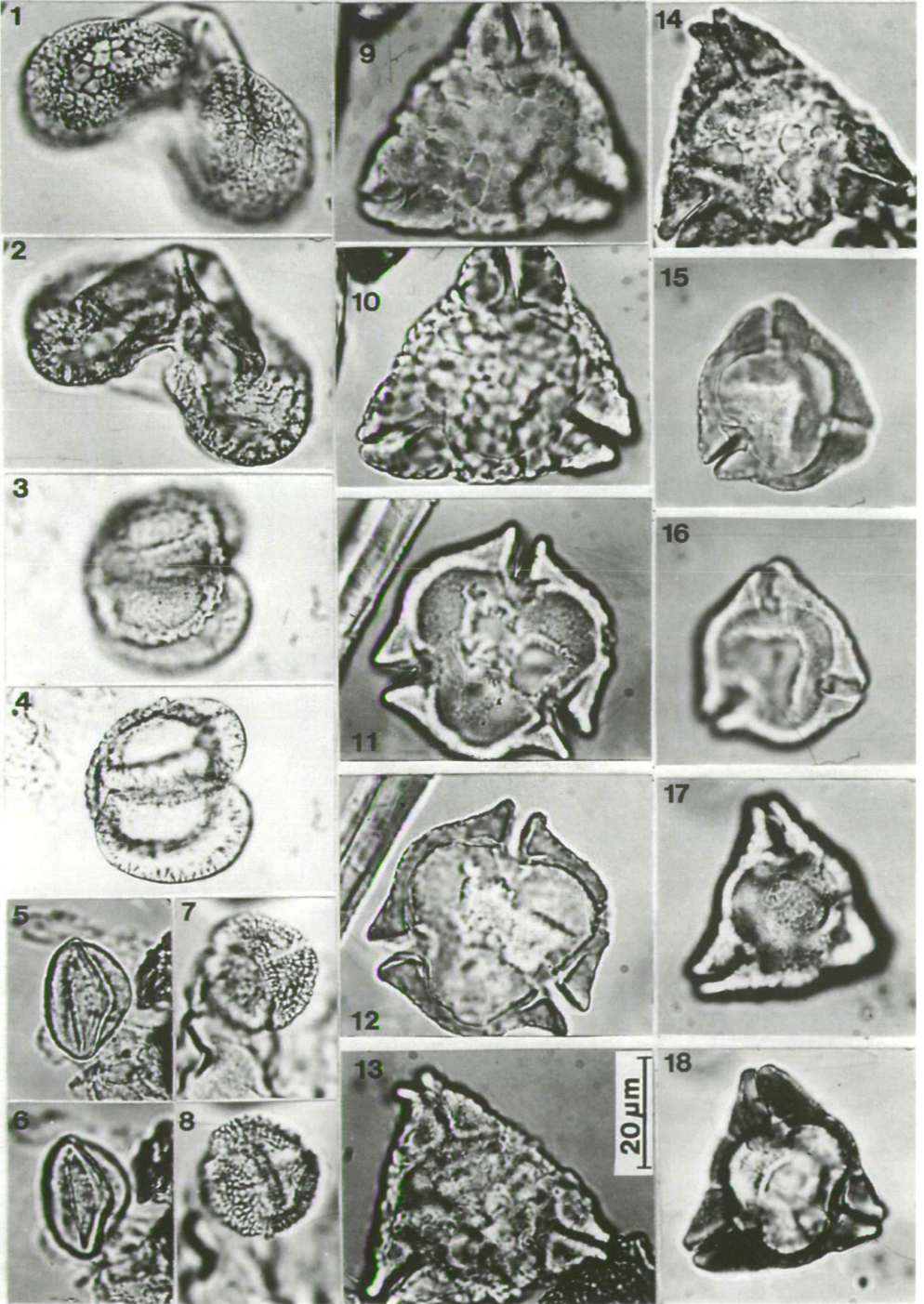


Plate 3.2.

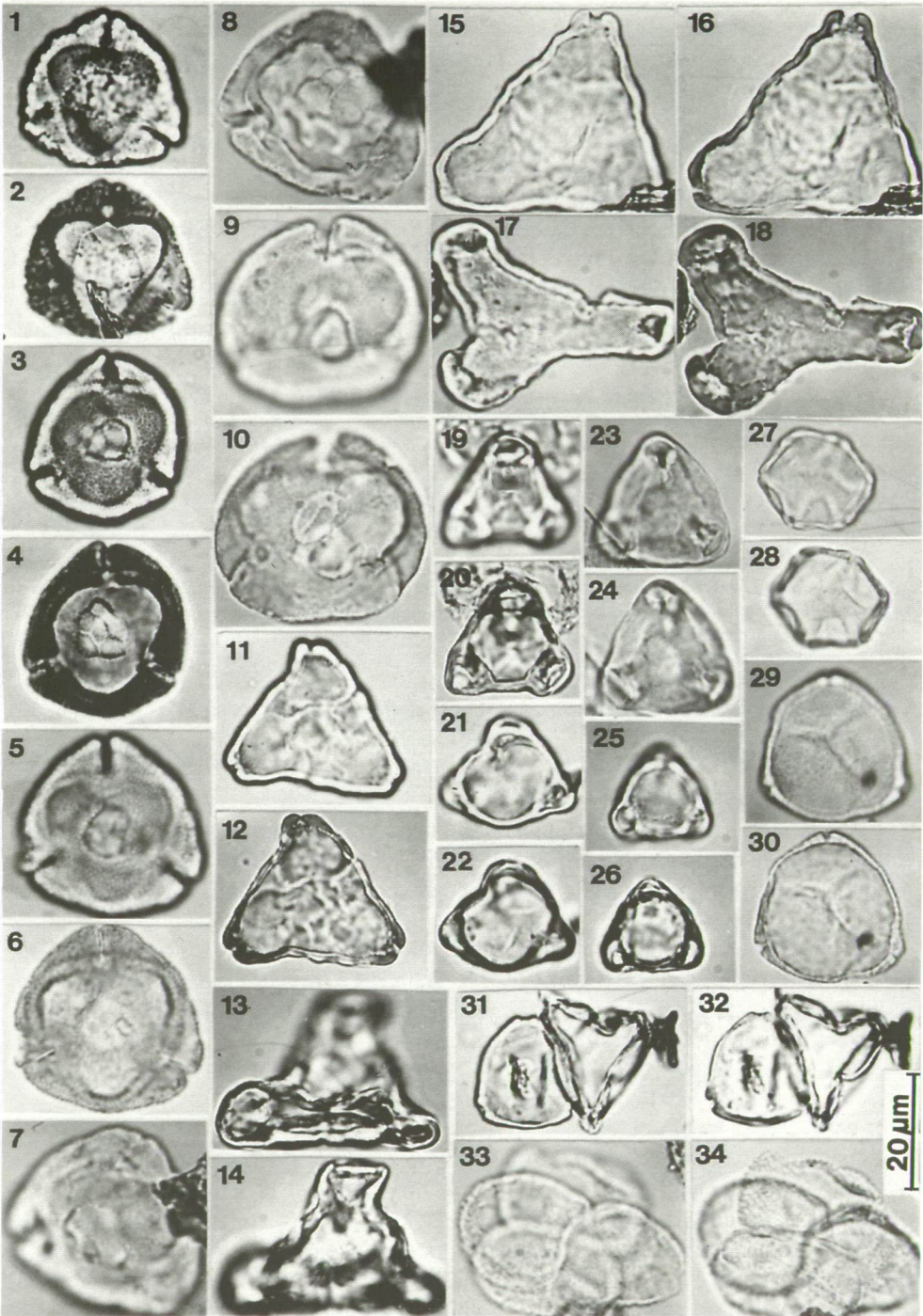


Plate 3.3.