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PALYNOFLORISTIC CORRELATIONS  
OF TWO ALBIAN SECTIONS  
OF PORTUGAL

POR  
JACQUES MEDUS \*

ABSTRACT

On the basis of two assemblages, eighty-three mostly pteridophytic palynological forms allow us to correlate the albian deposits layered on the upper sandstones of Almargem from Crismina with those of Foz in Portugal. The upper assemblage is related to the Upper Albian and Cenomanian stratas; the lower one, also found in the upper part of the facies of Almargem, appears to be of a Middle Albian age.

RESUMEN

En base a dos asociaciones de formas palinológicas de pteridofitas, se han podido correlacionar los depósitos albenses superpuestos a las areniscas superiores de Almargem en Crismina con los de Foz, en Portugal. La asociación superior se atribuye al Albense superior o al Cenomanense; la inferior, también encontrada en la parte superior de las facies de Almargem, parece Albense medio.

NOTA.—El texto de este trabajo está constituido por el propio resumen, desarrollado en forma gráfica).

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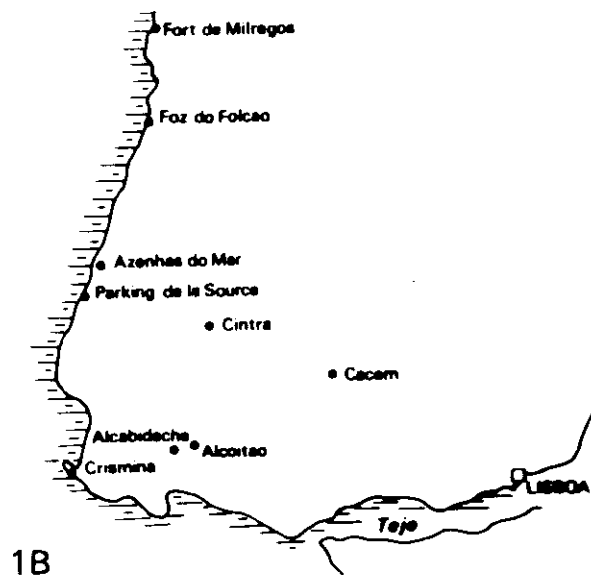
Folcao

21
17
16
11
10
9
8
7
6
23 1

1A

Crismina

41
39
38
33
32
27
26
17



1B

## LOCATION AND STRATIGRAPHY OF THE SAMPLES

Text-fig. 1 B shows the localities sampled and text-fig. 1 A their relative position in the sections. At Folcao, levels 1, 2, 3 lie in the upper part of the Upper Sandstones of Almargem; 6, 7, 8, 9 and 10 in the Lower to Middle Albian; 11, 16, 17 and 21 in the Upper Albian. At Crismina, 17 lies in the lower part of the Upper Sandstones of Almargem; 26, 27, 32, 33 and 38 in the Lower to Middle Albian; 39 and 41 in the Upper Albian.

FM = Lower Sandstones of Almargem at Milregos.

Az = Upper Albian at «Parking de la Source».

Cn = Cenomanian palynofloras from Cacem and Alcabideche.

A contribution to Project Mid-Cretaceous Events.

	Folcao	1	2	3	6	7	8	9	10	11	16	17	21	Az	Cn
	Crismina <sup>FM</sup>	17	26	27	32	33	38	39	41						
Appendicisporites sp., 7, 5										+				+	+
Leiotriletes rotundus, 2, 3															
Cf. Cingulatisporites distaverrucosus, 8, 1-3															
Patellasporites tavarensis															
Cingulatisporites distaverrucosus, 12, 2-3-9-11-14															
Collarisporites fuscus, 12, 4-7-12															
Combaculatisporites cretaceus, 4, 2-3															
Biretisporites potoniaei, 2, 8															
Verrucosisporites rotundus, 6, 4															
Vinculisporites flexus, 1, 10															
Camarozonosporites insignis, 6, 3															
Cingulatisporites distaverrucosus f. undulatus, 11, 3 et 12, 5-8															
Bullasporis aequatorialis, 11, 9															
Leiotriletes mecklenburgensis, 1, 2*															
Trilobosporites sp. aff. T. tylotos, 4, 1															
Cibotioidites sp. cf. C. walnutensis, 5, 1															
Lygodiosporites sp. f. rotundus, 10, 12															
Trilobosporites hannonicus, 3, 1-2															
Trilobosporites trioreticulatus															
Stereisporites antiquasporites, 1, 7															
Cicatricosisporites erdtmani															
Retitriletes saltimaniolus, 6, 1															
Zebrasporites interscriptus, 6, 2															
Kuylisporites lunaris, 5, 8															
Perotriletes sp. cf. P. rugulatus, 4, 6															
Lycopodiumsporites glebulentus, 5, 3															
Cingutriletes clavus, 10, 5															
Camarozonosporites sp., 5, 4-5															
Achradosporites sp. cf. A. vitellinus, 12, 6															
Clavipollenites-Asteropollis															
Retimonocolpites peroreticulatus															
Tetradopollenites spp.															
Striatopollis sp.															
Retitricolpites vermicurus															
Tubifloridites aedicula.....															

	Folcao	1	2	3	6	7	8	9	10	11	16	17	21		
	Crismina	FM	17	26	27	32	33	38	39	41	Az	Çn			
Cyathidites minor, 1, 6		x	x	x	x	x	x	x	x	x	x	x	x		
Convruccosporites platyverrucosus, 6, 9			x	x	x	x	x	+	x				+		
Concavissimisporites variverrucatus, 3, 5			x		x	x	x	+	x			+	+		
Cingutritetes sp. 1, 2, 4-5			x	x	x	x	x	+	x	x	x	x	x	+	
Cicatricosporites proxiradiatus, 9, 5			x	x	x	x	x	x	x	x	x	x	x	+	
Stereisporites sp. f. rotundus, 1, 4-5			x	x	x	x	x	+	x	x	x	x	x	+	
Patellasporites distaverrucosus, 11, 6-12; 12, 10-13			x	x	x	x	x	x	x	x	x	x	x	+	+
Uvaesporites glomeratus, 11, 4-7-8-11			x	x	x	x	x	+	x	x	+	+	x	+	+
Acylomurus sejunctus, 12, 1			x		x	+	x	x	x	x	x	x	x	+	
Marattisporites scabratus, 2, 6			x	x	x	+	x	x	x	x	x	x	x	+	
Verrucatosporites chaloneri, 2, 7			x	x	x	+	x	x	x	x	x	x	x	+	
Cicatricosporites venustus, 9, 4			x	x	x	x	x	x	x	x	x	x	x	+	+
Gleicheniidites senonicus, 2, 10			x	x	x	x	x	x	x	x	x	x	x	+	+
Dictyophyllidites adiaphoros, 1, 8			x		x	x	x	x	x	x	x	x	x	+	
Densoisporites sp. f. minor, 10, 10-11			x	x	x	x	x	x	x	x	x	x	x		
Lycospora sp., 2, 9-12-13			x	x	x		x	x	x	x	x	x	x		
Convruccosporites proxigranulatus, 10, 1-2			x		+	+	+		x						
Osmundacidites wellmani, 3, 3-4			+				x								
Matonisporites equiexinus, 2, 1			+	x	+	x	x	+	+	+					
Concavissimisporites punctatus, 3, 7			x	x	x	x	x	+	+	+					
Heliosporites sp., 7, 5			x		x	+	+	+	+	+	+	+	+	+	
Biretisporites deltoidus, 1, 9			x		x	x	x	+	x	+					
Convruccosporites sp. cf. C. platyverrucosus, 6, 6			x		x	x	x	x	+	+					
Densoisporites microrugulatus, 11, 1			+	x											
Densoisporites perinatus, 10, 7; 11, 2			x		x	x	x	x	x	x					
Cicatricosporites potomacensis, 7, 6			x	x	x										
Cicatricosporites analica, 7, 2-3			x	x	x	+	x								
Matonisporites sp. aff. M. excavatus, 8, 2-4-6							x	+					x		
Appendicisporites unicus, 8, 7-8							x						+	x	
Matonia pectinata, 1, 1-3			x		x		x						x		
Lycopodiacidites intraverrucatus, 5, 7							x						+		
Cicatricosporites brevilaeuratus, 7, 1-4-7			x										+		
Trilobosporites bernissartensis, 4, 5			x	x				+	+						
Convruccosporites sp. f. pentagonum, 6, 7-8-10					x		x						x		
Coronatispora valdensis, 9, 1-2-3			x					+							
Cirratiradites teter, 11, 5-10-13							x						x	+	
Todisporites minor, 2, 2-11							x						+	+	
Apiculatisporites sp. f. clavus, 9, 7-8-9							x	x	x						
Polypodiaceoisporites sp., 5, 2							x	+	x						
Taurocusporites segmentatus										x					
Crybelosporites pannuceus										+			x		
Lygodioisporites perverrucatus, 6, 5							x						+		+
Concavissimisporites informis, 5, 9								+	x	+					
Foveotritetes subtriangularis, 9, 6; 10, 9								+	x	+					
Granulatisporites dailyi, 5, 6										x	+	+	+		
Trilobosporites sp. cf. T. bernissartensis, 3, 6			+								x				
Taurocusporites reduncus										x	x	x	+	+	+
Chomotritetes triangularis, 4, 4										x			+	x	
Cf. Inaperturopollenites(?) pseudoreticulatus, 10, 3-6-8										+				x	

PLATE 1

All figures  $\times 1000$

- 1, 2. *Matonia pectinata* R. Br. in Couper, 58, 20, 11 (Folcao 2).
2. *Leiotriletes mecklenburgensis* Döring, 65 (Crismina 26).
- 4, 5. *Stereisporites* sp. forma rotundus (Folcao 9).
6. *Cyathidites minor* Couper in Brenner, 63, 11, 7 (Folcao 6).
7. *Stereisporites antiquasporites* (Wilson et Webster) Dettmann in Phillips and Felix, 71, 1, 1 (Folcao 8).
8. *Dictyophyllidites adiaphoros* Philips et Felix, 71 (Folcao 1).
9. *Biretisporites deltooidus* (Delc. et Sprum.) Delc., Dett. et Hughes in Phillips and Felix, 71, 3, 11 (Folcao 8).
10. *Vinculisporites flexus* Deak, 62 (Crismina 39).

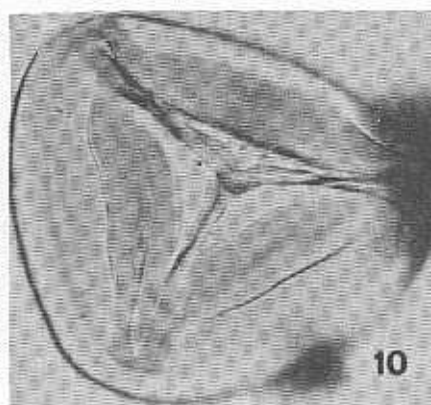
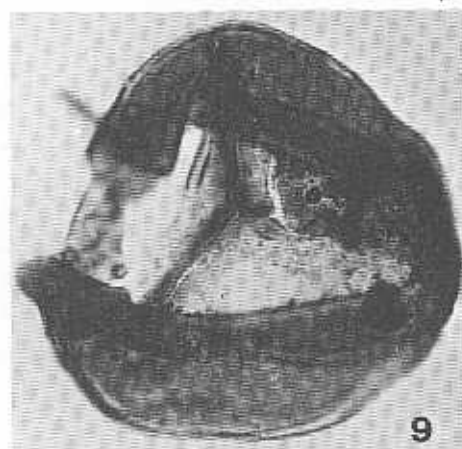
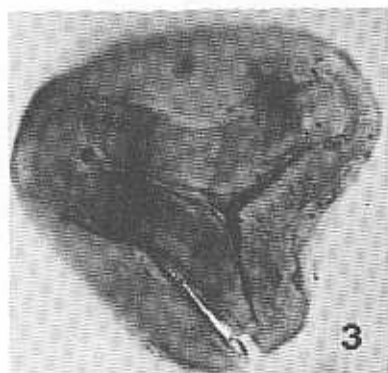
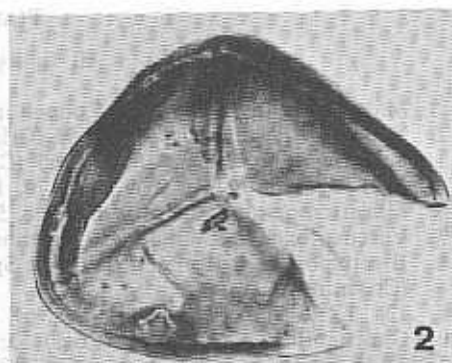
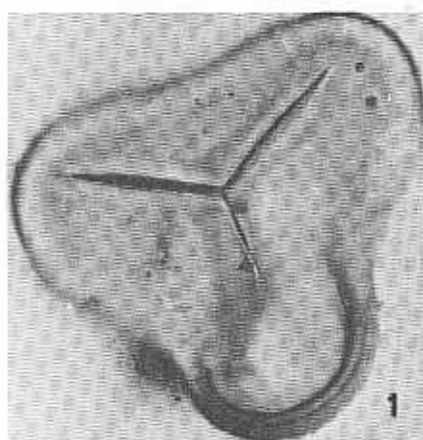


PLATE 2

All figures  $\times 1000$

1. *Matonisorites equixinus* Couper in Burger, 66, 2, 3 (FM).
2. *Todisorites minor* Couper, 58 (Crismina 38).
3. *Leiotriletes rotundus* Döring, 65 (Crismina 41).
- 4, 5. *Cingutriletes* sp. in Kemp, 70, 19, 7-8 (4 = Folcao 6; 5 = F 1).
6. *Marattisorites scabratus* Couper, 58 (F 8).
7. *Verrucatosporites chaloneri* (Brenner) Kemp, 70 (Crismina 33).
8. *Biretisorites potoniaei* Delc. et Sprum. in Hedlund and Norris, 68, 1, 5 (Crismina 39).
- 9, 12, 13. *Lycospora* sp. in Sing, 64, 1, 12-15 (F 1).
10. *Gleicheniidites senonicus* (Ross) Kemp, 70 (F 1).
11. *Todisorites minor* Couper, 58 (F 8).



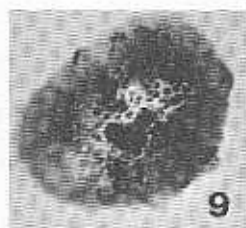
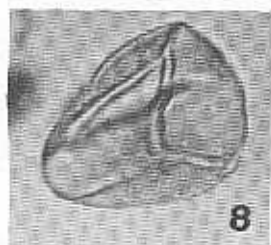
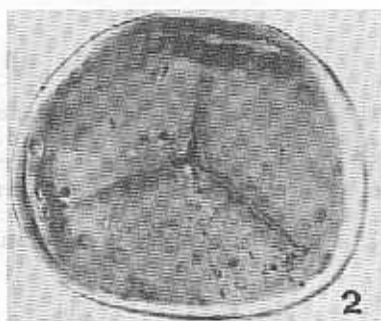
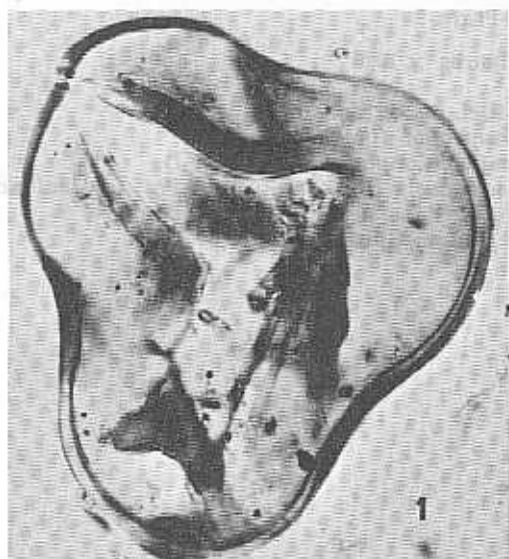


PLATE 3

All figures  $\times 1000$

- 1, 2. *Trilobosporites hannonicus* (Del. et Sprum.) R. Pot. (FM).
- 3, 4. *Osmundacidites wellmani* Couper, 58 (FM).
5. *Concavissimisporites variverrucatus* (Couper) Singh, 64 (F 1).
6. *Trilobosporites* sp. cf. *T. bernissartensis* (Del. et Sprum.) Pot. in Hedlund and Norris, 68 (FM).
7. *Concavissimisporites punctatus* (Del. et Sprum.) Singh, 64 (F 1).

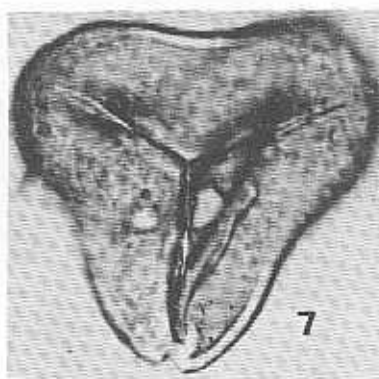
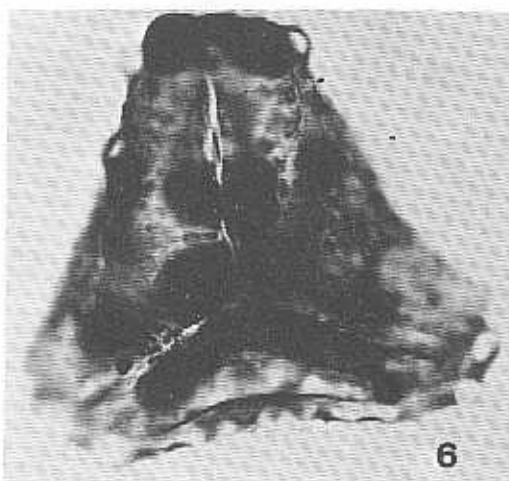
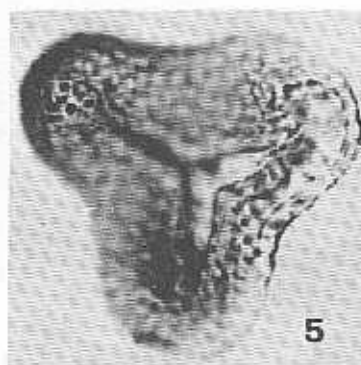
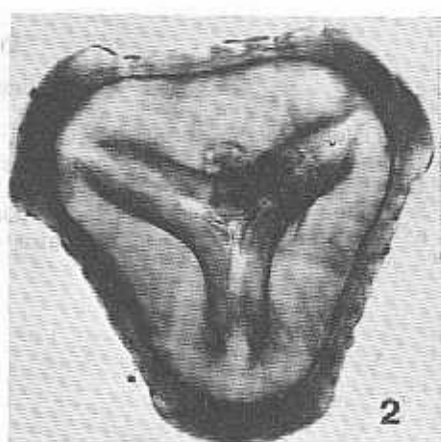
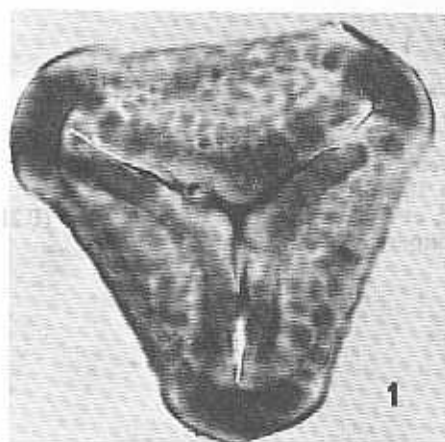


PLATE 4

All figures  $\times 1000$

1. *Trilobosporites* sp. aff. *T. tylotos* S. K. Srivastava, 75 (*Crismina* 27).
- 2, 3. *Combaculatisporites cretaceus* Deak, 62 (*Crismina* 39).
4. *Chomotriletes triangularis* Bolch. in Deak, 62 (F 17).
5. *Trilobosporites bernissartensis* (Delc. et Sprum.) R. Pot. in Couper, 58 (F 21).
6. *Petrotriletes* sp. cf. *P. rugulatus* Couper, 58 (F 2).

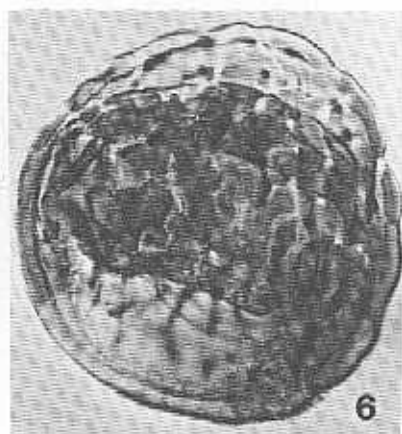
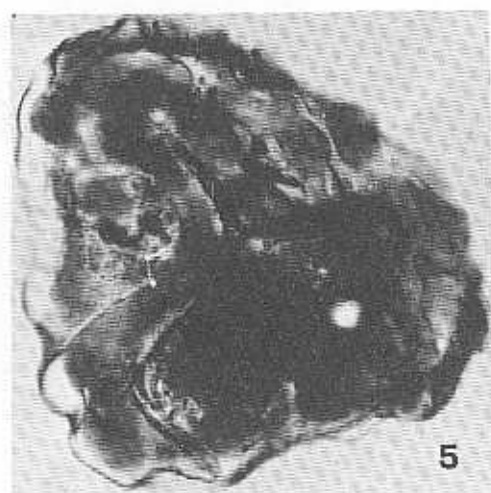
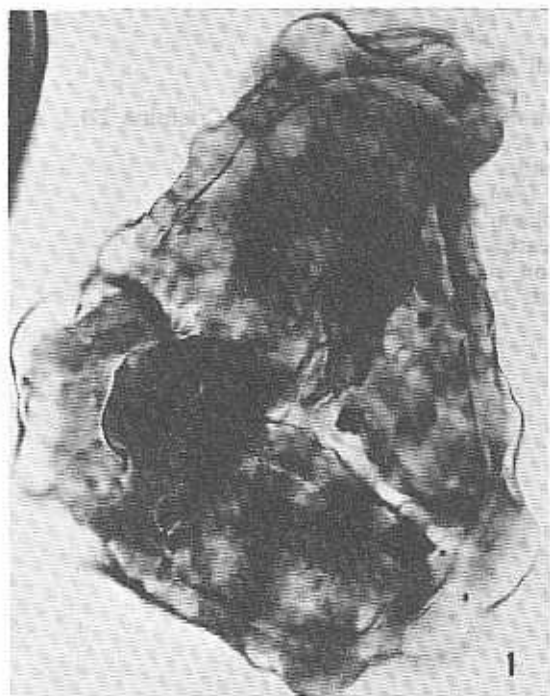


PLATE 5

All figures  $\times 1000$

1. *Cibotiidites* sp. cf. *C. walnutensis* S. K. Srivastava, 75 (Crismina 27).
2. *Polypodiaceoisporites* sp. in Kemp, 70 (F 8).
3. *Lycopodiumsporites glebulentus* Kemp, 70 (F 1).
- 4, 5. *Camarozonosporites* sp. (F 6).
6. *Granulatisporites dailyi* Cookson in Brenner, 63 (F 10).
7. *Lycopodiacidites intraverrucatus* Brenner, 63 (F 8).
8. *Kuylisporites lunaris* Cookson et Dettmann in Brenner, 63 (F 8).
9. *Concavissimisporites informis* Döring in Dörhöfer, 77 (F 10).

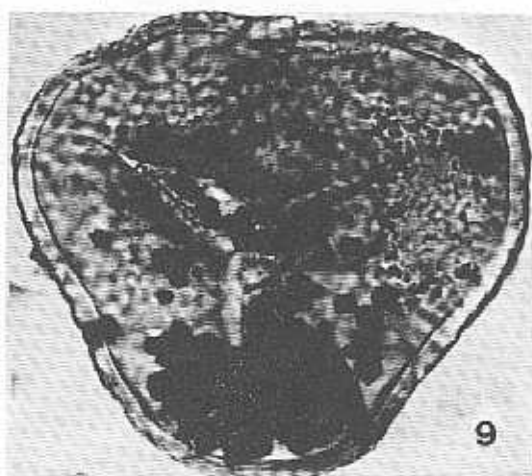
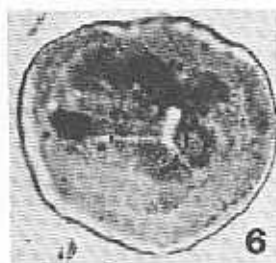
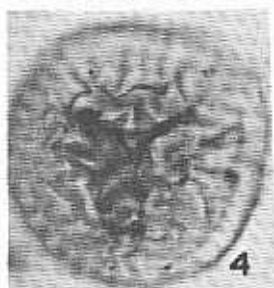
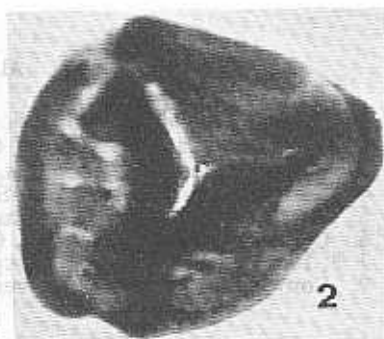
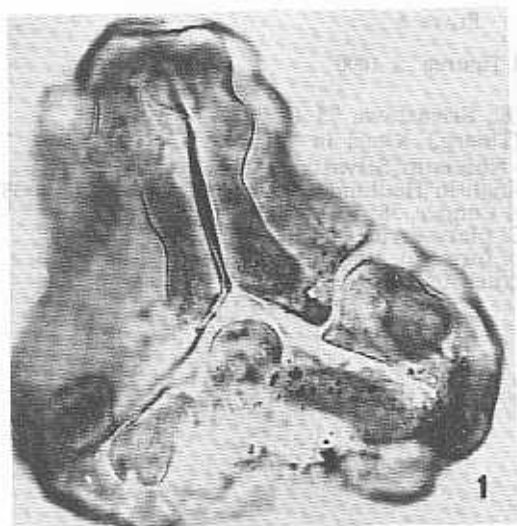


PLATE 6

All figures  $\times 1000$

1. *Retitriletes saltimaniolus* S. K. Srivastava, 75 (F 10).
2. *Zebrasporites interscriptus* (Thierg.) Klaus in Gluzbar, 73 (F 6).
3. *Camarozonosporites insignis*. Norris in Srivastava, 75 (Crismina 38).
4. *Verrucosisporites rotundus* Singh in Hedlund and Norris, 68 (Crismina 33).
5. *Lygodiosporites perverrucatus* Couper, 58 (F 8).
6. *Converrucosisporites* sp. cf. *C. platyverrucosus* Brenner, 63 (F 8).
- 7, 8, 10. *Converrucosisporites* sp. forma pentagonum (7 = F 8; 8, 10 = F 3).
9. *Converrucosisporites platyverrucosus* Brenner, 63 (F 11).



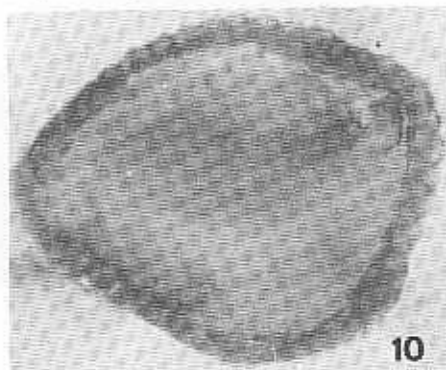
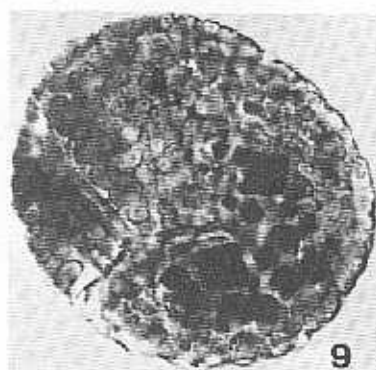
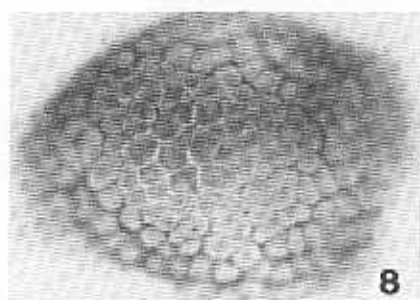
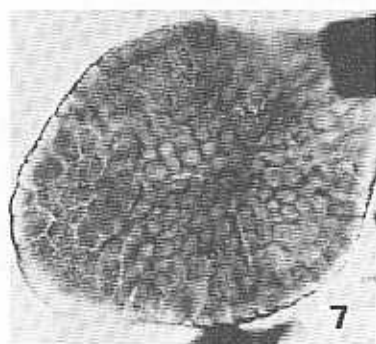
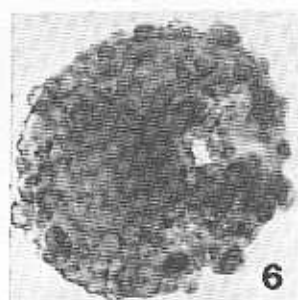
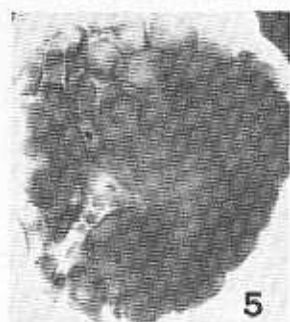


PLATE 7

All figures  $\times 1000$

- 1, 4. *Cicatricosisporites brevilaesuratus* Couper emend. Kemp, 70 (*Crismina* 33).
2. *Cicatricosisporites aralica* (Bolkh.) Brenner in Phillips and Felix, 71 (*Crismina* 27).
3. *Cicatricosisporites aralica* (Bolkh.) Brenner in Phillips and Felix 71 (F 8).
5. *Heliosporites* sp. in Norris, 69 (F 8).
6. *Cicatricosisporites potomacensis* Brenner, 63 (F 8).
7. *Cicatricosisporites brevilaesuratus* Couper emend. Kemp, 70 (F 8).

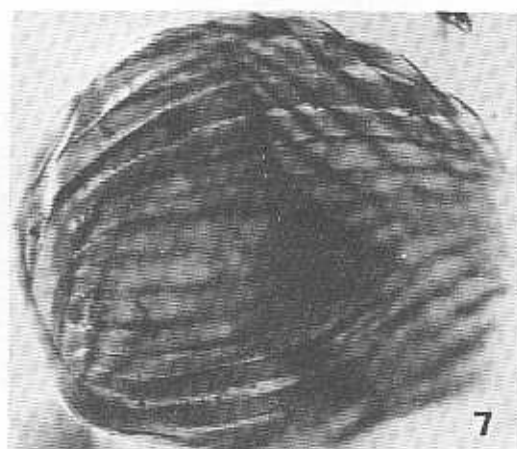
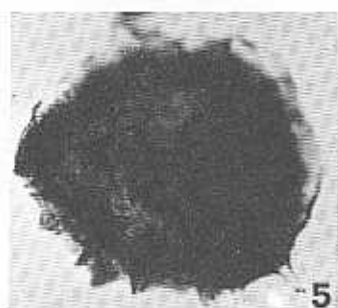
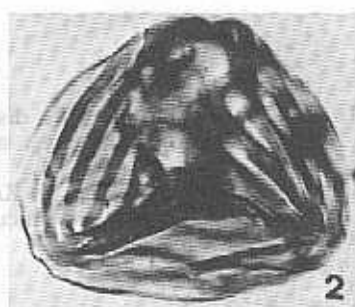
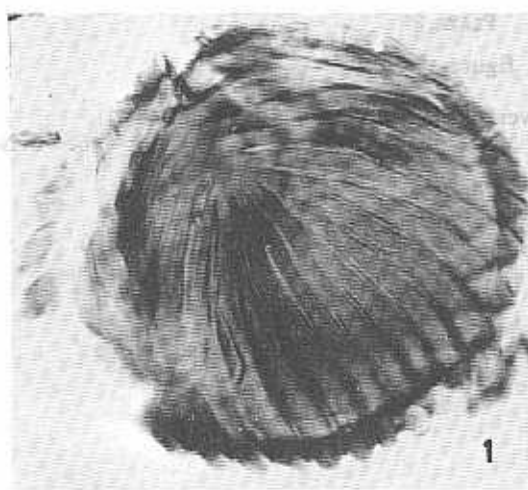


PLATE 8

All figures  $\times 1000$

- 1, 3. Cf. *Cingulatisporites distaverrucosus* Brenner, 63 (Crismina 41).
- 2, 4, 6. *Matonisorites* sp. aff. *M. excavatus* Brenner, 63 (2 = F 8; 4, 6 = Crismina 26).
5. *Appendicisporites* sp. in Kemp, 70 (F 1).
- 7, 8. *Appendicisporites unicus* (Markova) Sing, 64 (F 6).



Plate 2  
Figures 1-1000  
... (Corymb) ...  
... in Kern, 75 ...  
... Kern, 70 (F. 1) ...  
... Kern, 55 (F. 10) ...  
... (F. 1) ...  
... (Corymb) ...

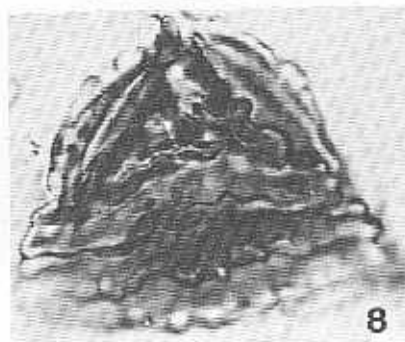
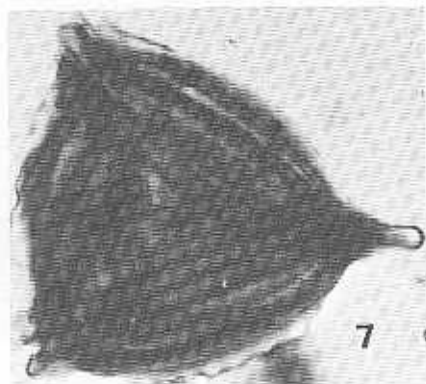
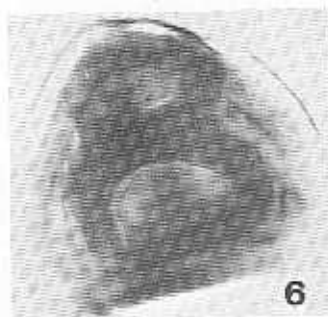
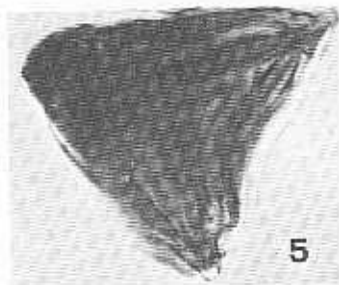
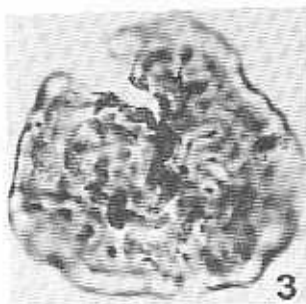
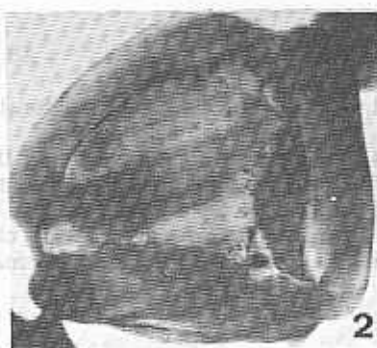


PLATE 9

All figures  $\times 1000$

- 1, 2, 3. *Coronatospora valdensis* (Couper) Dettmann in Srivastava, 75 (1 = F 1; 2, 3 = Crismina 26).
4. *Cicatricosisporites venustus* Deak in Kemp, 70 (F 8).
5. *Cicatricosisporites proxiradiatus* Kemp, 70 (F 1).
6. *Foveotriletes subtriangularis* Brenner, 63 (F 10).
7. *Apiculatisporites* sp. forma clavus (F 8).
- 8, 9. *Apiculatisporites* sp. forma clavus (Crismina 27).

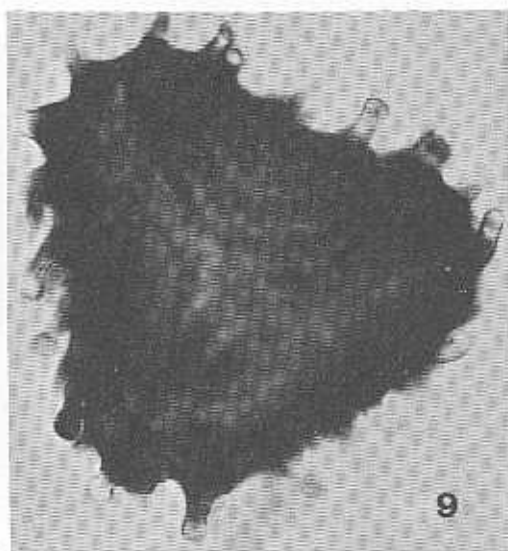
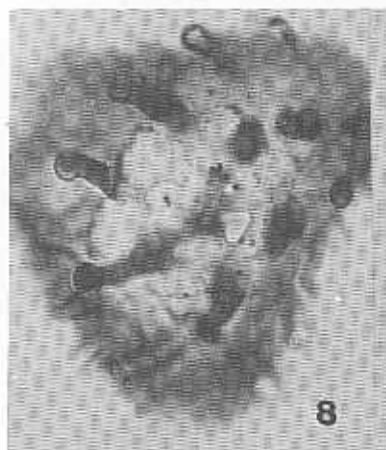
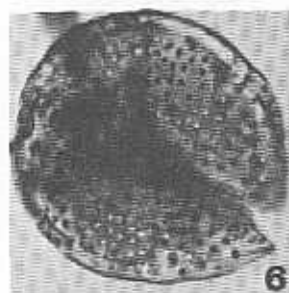
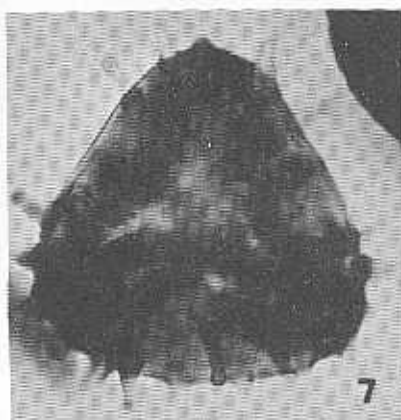
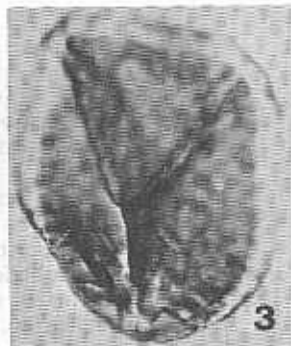


PLATE 10

All figures  $\times 1000$

- 1, 2. *Converrucosisporites proxigranulatus* Brenner, 63 (1 = F 1; 2 = F 11).
- 3, 6, 8. Cf. *Inaperturopollenites pseudoreticulatus* Brenner, 63 (3 = F 17; 6, 8 = Crismina 27).
4. *Converrucosisporites proxigranulatus* Brenner, 63 (Crismina 26).
5. *Cingutriteles clavus* (Balme) Dettmann in Norris, 67 (F 6).
7. *Densoisporites perinatus* Couper in Brenner, 63 (F 2).
9. *Foveotriteles subtriangularis* Brenner, 63 (Crismina 26).
- 10, 11. *Densoisporites* sp. forma minor.
12. *Lygodioisporites* sp. forma rotundus (Crismina 27).



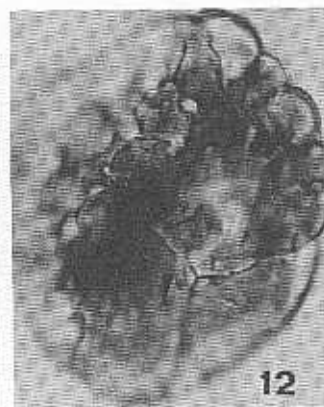
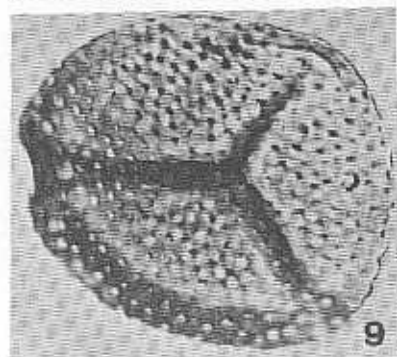
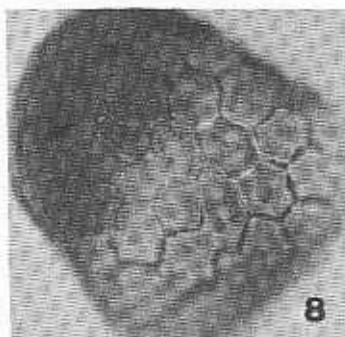
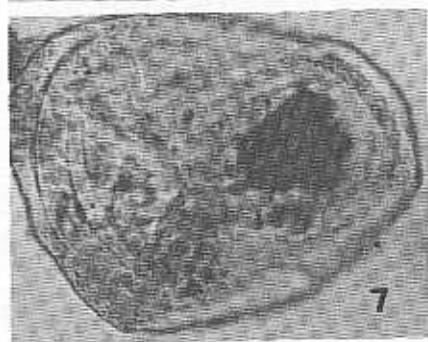
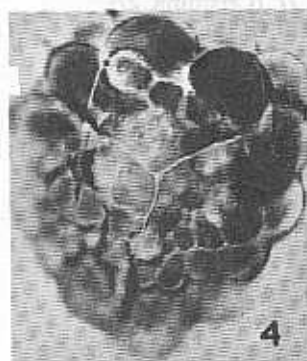


PLATE 11

All figures  $\times 1000$

1. *Densoisporites microrugulatus* Brenner in Burger, 66 (FM).
2. *Densoisporites perinatus* Couper in Brenner, 63 (Crismina 26).
3. *Cingulatisporites distaverrucosus* forma *undulatus* (Cn).
- 4, 7. *Uvaesporites glomeratus* Döring, 65 (Cn).
- 5, 10, 13. *Cirratiradites teter* Norris, 67 (5, 13 = F 8; 10 = F 8).
6. *Patellasporites distaverrucosus* (Brenner) Kemp, 70 (Crismina 39).
- 8, 11. *Uvaesporites glomeratus* Döring, 65 (8 = F 1; 11 = F 11).
9. *Bullasporis aequatorialis* Krutzsch in Dörhöfer, 77 (Crismina 27).
12. *Patellasporites distaverrucosus* (Brenner) Kemp, 70 (F 11).

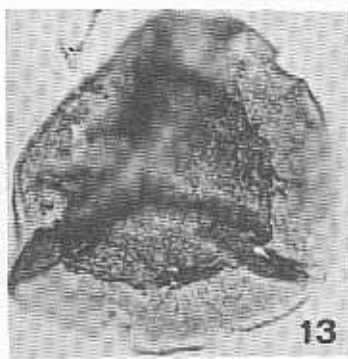
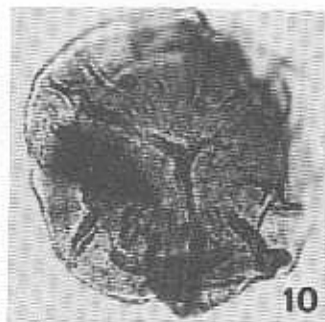
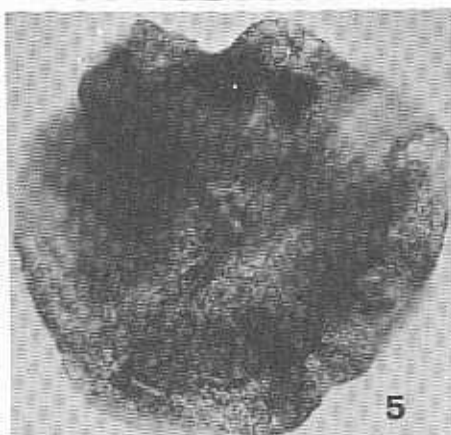
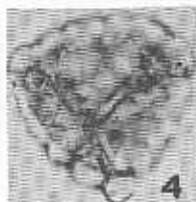
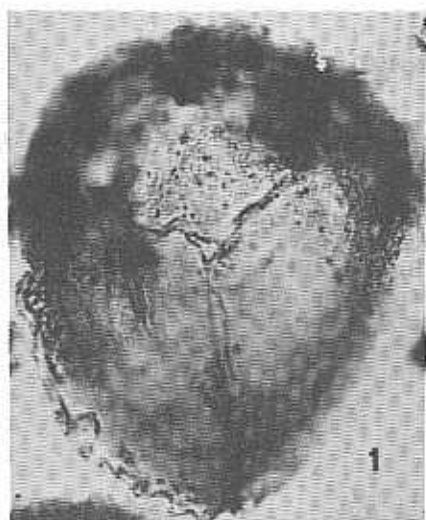


PLATE 12

All figures  $\times 1000$

1. *Acylomurus sejunctus* Phillips et Felix, 71 (F 8).
- 2, 3, 14. *Cingulatisporites distaverrucosus* Brenner (2, 3 = Crismina 39; 14 = Cn).
- 4, 7, 12. *Collarisporites fuscus* Deak, 62 (Cn).
- 5, 8. *Cingulatisporites distaverrucosus* forma *undulatus* (Cn).
6. *Achradosporis* sp. cf. *A. vitellinus* S. K. Srivastava, 75 (F 1).
- 9, 11. *Cingulatisporites distaverrucosus* Brenner (Crismina 38).
10. *Patellasporites distaverrucosus* (Brenner) Kemp, 70 (F 8).
13. *Patellasporites distaverrucosus* (Brenner) Kemp, 70 (F 1).

