

## Early Cretaceous (Neocomian-Cenomanian) Palynomorphs

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### INTRODUCTION

This study is primarily concerned with the Neocomian to Aptian palynomorphs recorded in selected exploration wells (See Fig. 9). In order to document a complete Early Cretaceous microfossil succession in the studied wells, a reconnaissance of Aptian to Early Cenomanian palynomorphs was also undertaken. Details of the results from this younger interval appear in a later section.

Palynomorph assemblages vary in preservation and character. To the north, sandstone, siltstone and shale deposited in shallow-marine environments, contain well-preserved assemblages of dinoflagellate cysts, pollen and spores which can be used for stage-level age determination. A majority of the samples analysed, however, contain moderate numbers of dinoflagellate cysts, but fewer miospores. The abundance of land derived detritus indicates the relatively close proximity of the shoreline. In the central and southern parts of the study area, sandstone and siltstone that are deposited in non-marine, fluvial, lacustrine or lagoonal environments show a general paucity of well-preserved palynofloras. Miospores of stratigraphic value are generally rare or absent although the majority of the samples are dominated by land derived detritus.

### PALYNOMORPH SUCCESSION

The majority of the wells from northern Cyrenaica show a hiatus at the Jurassic Cretaceous boundary. Late Neocomian or Aptian sediments occur immediately above Middle or early Late Jurassic sediments. Well preserved Neocomian palynomorphs were recorded in wells A1-36, B1-36, Bla-18 and A1-45. The stratigraphical ranges of palynomorphs presented on the plate explanations are local ranges and are based on the studied intervals only. A preliminary palynological zonation of Late Jurassic (Late Kimmeridgian) to Late Cretaceous (Cenomanian) is presented in Fig. 9. This zonation is based on samples dated independently on microfaunal assemblages. Further refinement of this zonation is currently in progress.

Neocomian palynomorph assemblages are moderately diverse in composition containing both dinoflagellate cysts and miospores. The dinoflagellate cysts *Muderongia simplex*, *M. staurota*, *Phoberocysta neocomica* and several species of *Canningia* and *Cyclonephelium* make their first appearance during this interval. Miospores do not dominate the assemblages although there are large

quantities of terrestrial palynodebris in the majority of the samples studied. Bisaccate pollen are generally absent. Rare but consistently present miospores include *Trilobosporites* cf. *bernissartensis*, *Matonisporites crassiangularatus*, *Equitriradites spinulosus*, *Crybelosporites* cf. *striatus* (similar to *C. striatus* but larger in size), and several species of *Pilososporites*, *Concavisporites*, *Classopollis*, *Concavissimosporites*, *Cicatricosisporites* and inaperturate pollen (*Araucariacites*, *Inaperturopollenites*). *Callialasporites* and *Exesipollenites* occur sporadically. Microfossil subdivision within the Neocomian must await the completion of the study of additional samples.

Late Neocomian to Barremian palynomorphs are well-preserved but occur only in small numbers. The dinoflagellate cysts *Aptea anaphrissa*, *Gardodinium eisenacki*, *Coronifera oceanica* and several species of *Oligosphaeridium*, in association with the miospores *Dicheiropollis etruscus*, *Stellatopollis* cf. *barghoornii*, *Appendicisporites* spp., *Retimonocolpites* spp. and “*Inaperturopollenites*” *crisopolensis* show their earliest appearance in this interval. Some species from the Early Neocomian continue as infrequent or rare components, these include *Pareodinia ceratophora*, *Prolixosphaeridium granulosum*, *Canningia* spp., *Cyclonephelium* spp., *Cicatricosisporites* spp., *Crybelosporites* cf. *striatus*, *Concavisporites* spp., *Classopollis* spp., and inaperturate pollen.

Aptian dinoflagellate cyst assemblages contain abundant representatives of *Subtilisphaera senegalensis* and *Subtilisphaera* sp. together with rare *Pseudoceratium regium* and *Cribroperidium edwardsii*. Miospores from this interval contain the first appearance of *Afropollis* spp., *Reyrea polymorpha*, *Retitricolpites* spp., *Psilatricolpites* spp. and *Eucomiidites* sp. *Classopollis* is represented by abundant species of less than 30 microns. A number of species which disappear during this interval include “*Inaperturopollenites*” *crisopolensis*, *Stellatopollis* cf. *barghoornii*, *Callialasporites* spp., and *Appendicisporites* spp. *Ephedripites* spp., present in the Neocomian is more frequently encountered during the late Early Cretaceous. Inaperturate pollen, *Crybelosporites*, *Cicatricosisporites*, *Concavisporites* and *Pilososporites* continue as infrequent members of the assemblages.

Albian-Cenomanian palynomorph assemblages contain a number of distinctive dinoflagellate cysts including *Xenascus ceratioides*, *Cyclonephelium vannoi*

*phorum* and *Florentina* spp. Miospore assemblages from this interval are distinguished by the earliest appearance during the Albian of *Elaterosporites klaszii* and *Elaterocolpites castelainii* together with *Sofrepites legouxae*, tricolporate and triporate angiosperm pollen. Species of *Classopollis* less than 30 microns are replaced by larger forms of which *C. brasiliensis* is a good stratigraphic marker. Species of *Afropollis* and of the *Elaterosporites* group disappear in the Early Cenomanian but *Cicatricosisporites*, *Crybelosporites*, *Retimonocolpites*, *Tricolpites* and inaperturate pollen continue to occur.

#### SARIR (NUBIAN) SANDSTONE

Sediments from within this unit, in the central and southern parts of the project area, where it was deposited in fluvial, lacustrine or lagoonal environments show a general paucity of well preserved palynomorphs. Miospores of stratigraphical value are generally rare. Taxa frequently present include *Cerebropollenites mesozoicus*, *Concavisporites* spp., *Classopollis* spp., *Araucariacites* sp. and rarely *Alisporites* sp. These miospores are not age diagnostic but suggest a Late Jurassic-Early Cretaceous age for the Sarir or Nubian sandstone. Samples from a limited number of wells have yielded microfloras which can be dated confidently as Neocomian-

Barremian, by the presence of *Dicheiropollis etruscus*, *Trilobosporites* sp. and *Cupressacites oxycedroides*. In one well, the rare occurrence of *Psilatricolporites* sp. and *Stellatopollis barghoornii* indicates an Aptian-Albian age.

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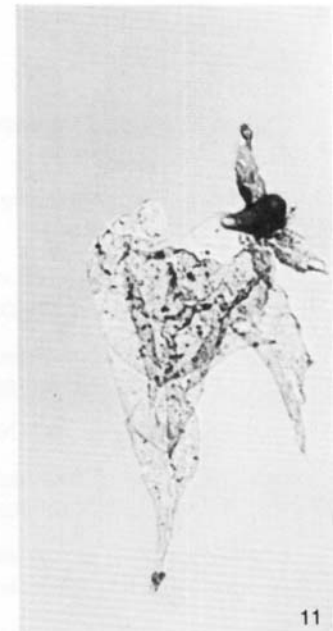
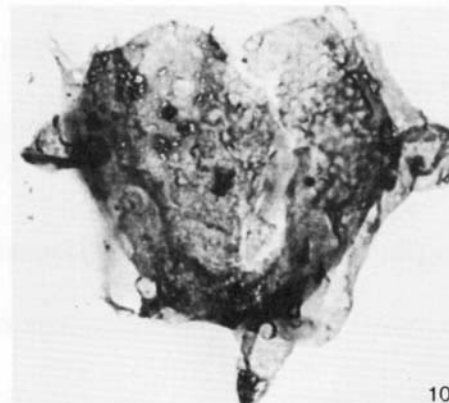
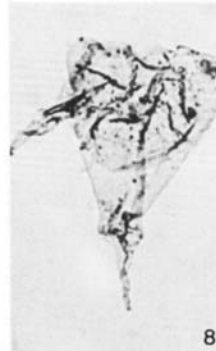
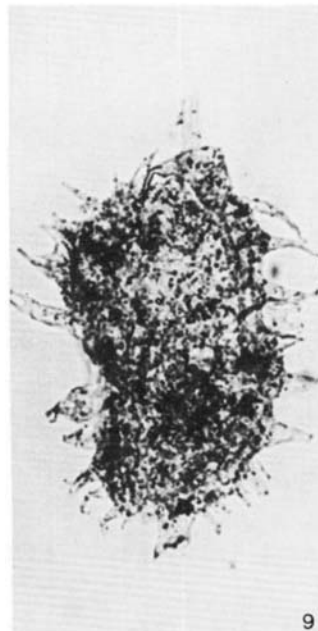
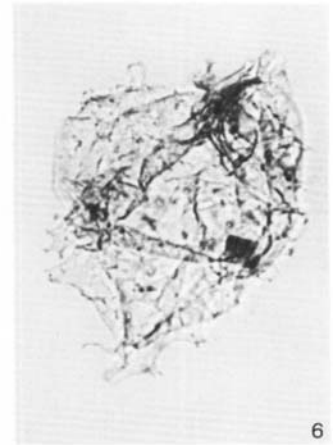
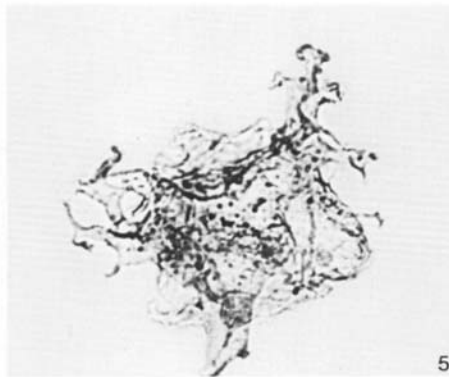
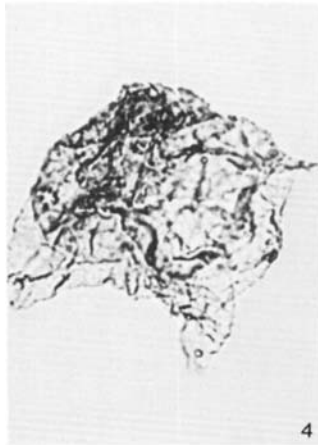
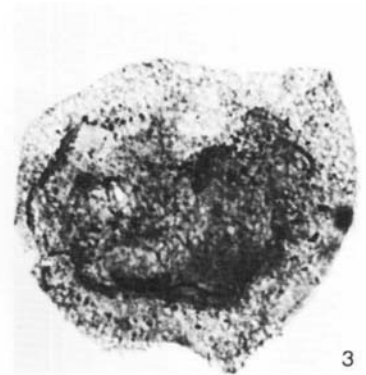
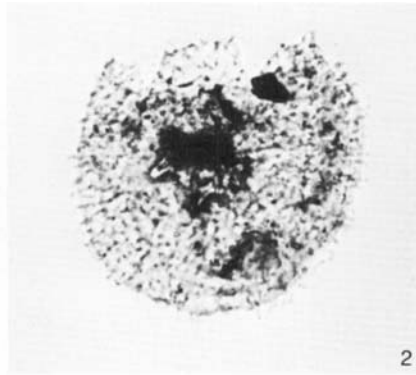
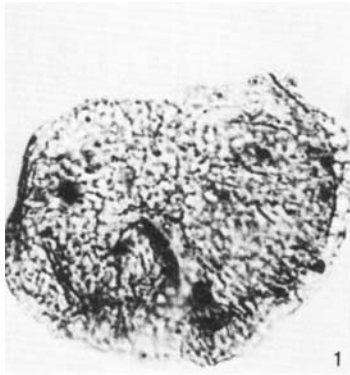
Fig. 9. Preliminary biostratigraphic succession of Late Jurassic (Late Kimmeridgian) to Late Cretaceous (Cenomanian) in North East Libya

AGE	KEY MICROFAUNA	KEY DINOCYSTS	KEY MIOspores	OTHER PALYNOMORPHS
CENOMANIAN	<i>Thomassinella punica</i> <i>Orbitolina</i> sp.	<i>Canningia baculata</i> <i>Subtilisphaera</i>	<i>Classopollis brasiliensis</i>	<i>Ephedripites</i> Triporate angiosperms <i>Cyclonephelium vannophorum</i>
ALBIAN	<i>Hedbergella delrioensis</i> <i>Rotalipora</i> gr. <i>micheli</i> <i>Whiteinella alpina</i> <i>Choffatella</i> spp.	<i>Xenascus ceratioides</i>	<i>Elaterosporites</i> group <i>Classopollis</i> < 30 μ <i>Afropollis</i> Tricolporate angiosperms	<i>Pilosporites trichopapillosus</i> (last occurrence) <i>Crybelosporites</i> cf. <i>striatus</i> <i>Araucariacites/Inaperturopollenites</i> <i>Cribroperidinium orthoceras</i> <i>Cribroperidinium edwardsii</i> <i>Florentinia</i>
APTIAN	<i>Cytherella</i> <i>Bisulcocypris</i> <i>Theriosynoeum</i> <i>Cypridea</i> with Aptian macroflora	<i>Subtilisphaera</i> sp. A <i>S. senegalensis</i>	<i>Psilatricolpites</i> <i>Afropollis</i> <i>Reyrea polymorpha</i> <i>Tricolpites</i> <i>Ephedripites</i>	<i>Pseudoceratium regium</i> <i>Callialasporites</i> (last occurrence) <i>Classopollis</i> spp. < 30 μ <i>Stellatopollis barghoornii</i> <i>Aptea polymorpha</i>
BARREMIAN	<i>Choffatella decipens</i>	<i>Aptea anaphrissa</i>	<i>Retimonocolpites</i> <i>Dicheiropollis etruscus</i> "Inaperturopollenites" <i>crisopolensis</i> <i>Stellatopollis barghoornii</i>	<i>Gardodinium eisenackii</i> <i>Coronifera oceanica</i> <i>Appendicisporites</i> <i>Retimonocolpites</i> <i>Cycadopites</i> <i>Oligosphaeridium complex</i> <i>Chomotriletes minor</i>
HAUTERIVIAN	<i>Micrantholithus</i> cf. <i>obtusus</i>	<i>Phoberocysta neocomica</i>	<i>Concavissimisporites</i>	<i>Concavissimisporites</i>
VALANGINIAN	<i>Nannoconus</i> cf. <i>steinmanni</i> <i>Calpionella alpina</i> <i>C. elliptica</i> <i>Tricholina alpina</i>	<i>Muderongia staurota</i>	<i>Trilobosporites</i> <i>Aequitriradites</i> <i>Pilosporites</i> <i>Contignisporites</i>	<i>Cicatricosisporites</i> (common) <i>Araucariacites/Inaperturopollenites</i> <i>Crybelosporites</i> cf. <i>striatus</i> <i>Prolixosphaeridium granulosum</i> <i>Canningia</i> <i>Cyclonephelium</i>
BERRIASIAN		<i>Canningia</i> <i>Muderongia simplex</i>		
TITHONIAN				
LATE KIMMERIDGIAN	<i>Pseudocyclammina jaccardi</i>	<i>Muderongia</i> sp. A <i>Millioudodinium globatum</i>	<i>Cicatricosisporites</i>	<i>Ctenodinium pannenum</i> <i>Gonyaulacysta</i> <i>Systematophora</i> sp. A <i>Lithodinia jurassica</i> <i>Contignisporites</i> <i>Concavissimisporites</i>

### Explanation of Plate 53

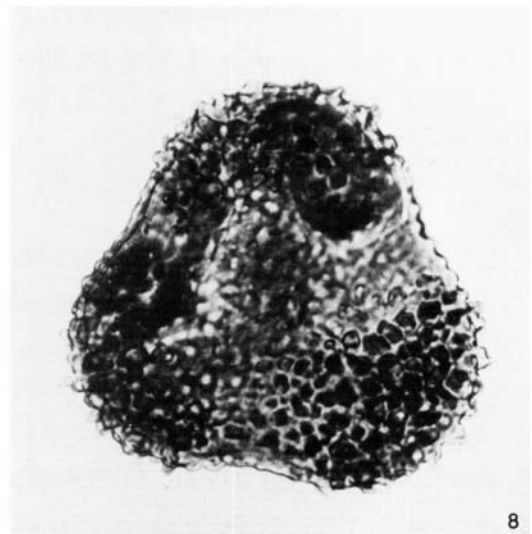
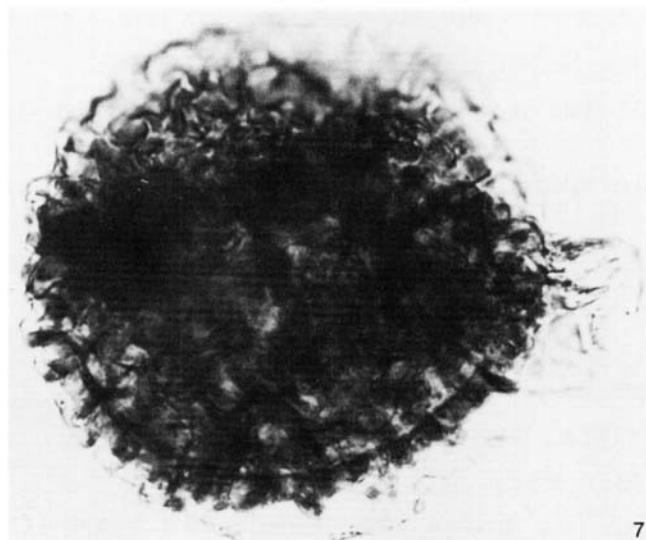
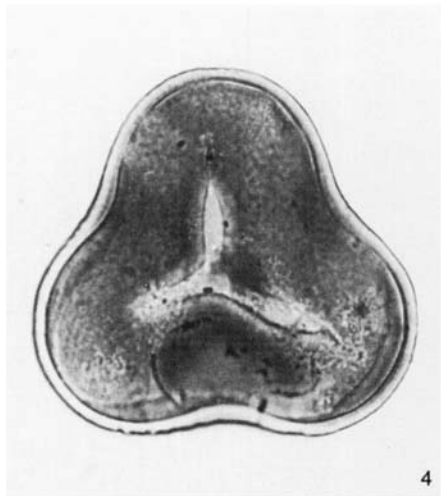
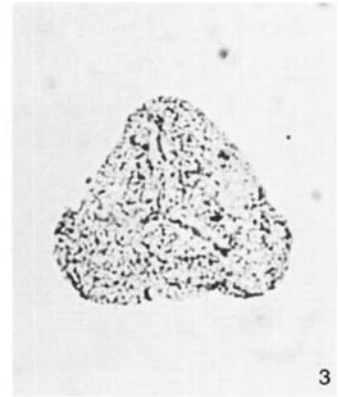
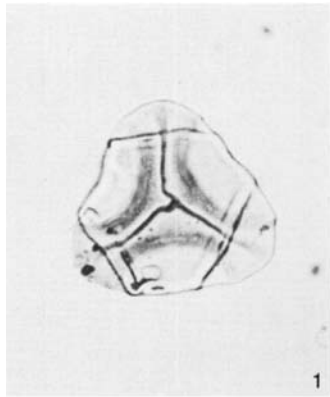
All figures are  $\times 500$

- Figs. 1, 3. *Canningia reticulata* Cookson & Eisenack, 1960 emend. Below 1981 1. A1-45, 12100-12250ft., Slide 3, R44/0, AGC 586. 3. A1-NC92, 5880-5890ft., Slide 3, N44/0, AGC 587. (Neocomian-Albian).
- Fig. 2. *Cyclonephelium distinctum* Deflandre & Cookson, 1955. A1-36, 10607-10617ft., Slide 1, L31/0, AGC 588. (Neocomian-Albian).
- Fig. 4. *Muderongia simplex* Alberti, 1961. B1-36, 10915-11010ft., Slide 2, M29/2, AGC 589. (Early Neocomian).
- Figs. 5, 6. *Phoberocysta neocomica* subsp. *neocomica* (Gocht, 1957) Millioud, 1969. 5. B1-36, 10734-10738ft., Slide 2, R43/3, AGC 590. 6. A1-36, 10607-10617ft., Slide 3, N45/1, AGC 591. (Neocomian).
- Figs. 7, 8. *Muderongia* cf. *staurota* Sarjeant, 1966. 7. A1-45, 9710-9900ft., Slide 3, N40/0, AGC 592. 8. A1-45, 10110-10300ft., Slide 2, N38/4, AGC 593. (Neocomian).
- Fig. 9. *Florentinia* sp. A. A1-45, 10110-10300ft., Slide 2, Q28/0, AGC 594. (Neocomian).
- Fig. 10. *Phoberocysta neocomica* subsp. *circulata* (Gocht, 1957) Lentin & Williams, 1973. R3-82, 3658m., Slide 1, L41/1, AGC 595. (Neocomian).
- Fig. 11. *Odontochitina operculata* (Wetzel, 1933), Deflandre & Cookson, 1955. A1-45, 9710-9900ft., Slide 3, J33/0, AGC 596. (Neocomian).



**Explanation of Plate 54**  
 All figures are  $\times 500$

- Fig. 1. *Concavisporites jurienensis* Balme, 1957. A1-36, 7870-7880ft., Slide 2, Y39/1, AGC 597. (Neocomian-Albian).
- Fig. 2. *Matonisorites crassiangulatus* (Balme, 1957) Dettmann, 1963. Bla-18, 7900-8000ft., Slide 4, N44/3, AGC 598. (Neocomian).
- Fig. 2. *Concavissimisorites* cf. *variverrucatus* (Couper, 1958) Brenner, 1963. GGG1-59, Core 11, 11382ft., Slide 2B, F49/0, AGC 599. (Neocomian).
- Fig. 4. *Concavissimisorites punctatus* (Delcourt & Sprumont, 1955) Brenner, 1963. A1-36, 7014-7066ft., Slide 2, F34/1, AGC 600. (Neocomian-Albian).
- Fig. 5. *Concavisporites* sp. A1-NC92, 6630-6640ft., Slide 3, Y32/4-K32/3, AGC 601. (Neocomian-Cenomanian).
- Fig. 6. *Trilobosporites* cf. *berrissartensis* (Delcourt & Sprumont, 1955) Potonié, 1956. Bla-18, 8500-8600ft., Slide 4, U35/4, AGC 602. (Neocomian).
- Fig. 7. *Crybelosporites* cf. *striatus* Dettmann, 1963. Bla-18, 5600-5700ft., Slide 4, U29/1-T29/3, AGC 603. (Neocomian-Early Cenomanian).
- Fig. 8. *Impardecispora apiverrucata* (Couper, 1958) Venkatachala *et al*, 1968. Bla-18, 6900-7000ft., P40/4-41/3, AGC 604. (Neocomian).

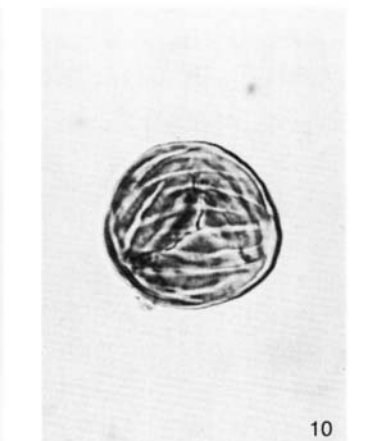
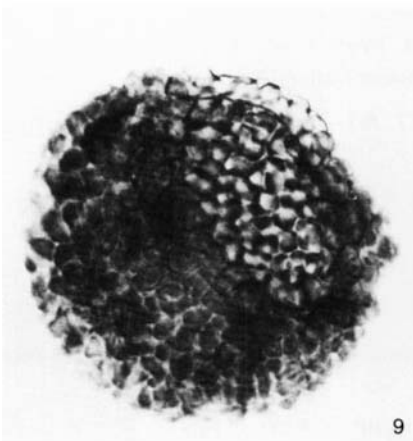
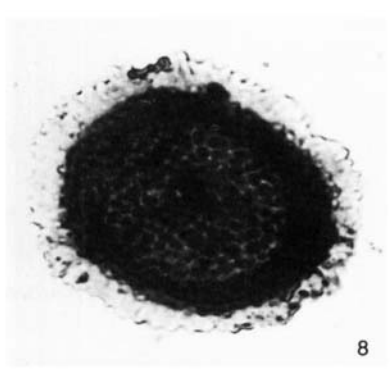
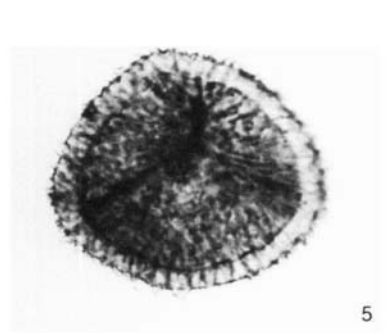
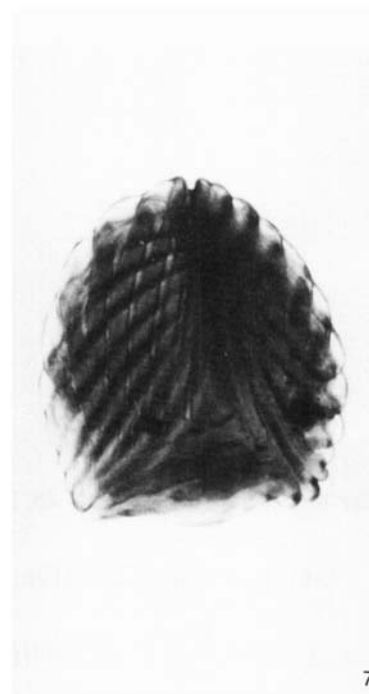
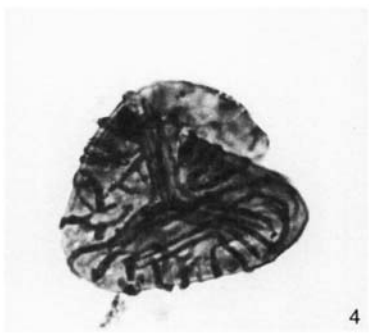
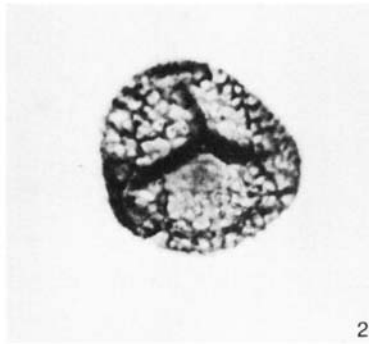
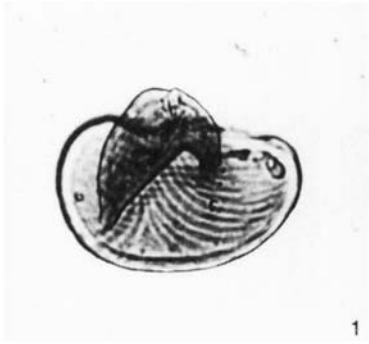


### Explanation of Plate 55

All figures are  $\times 500$

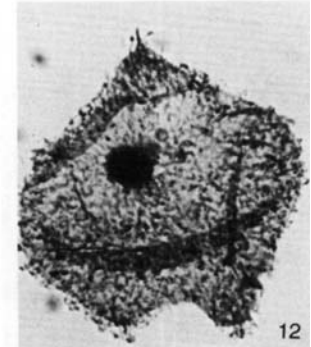
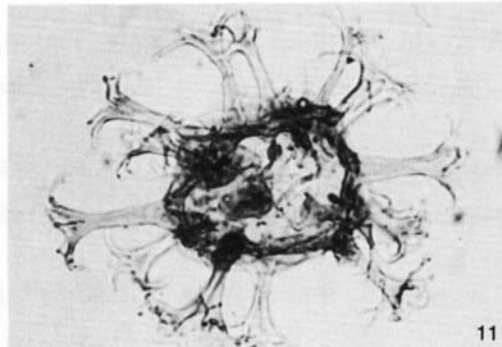
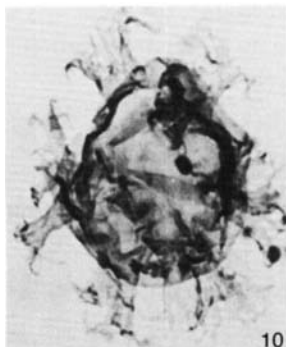
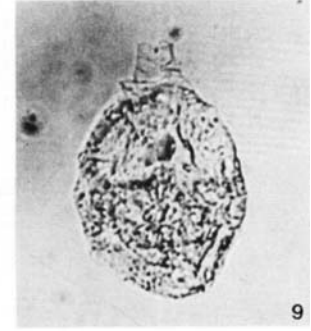
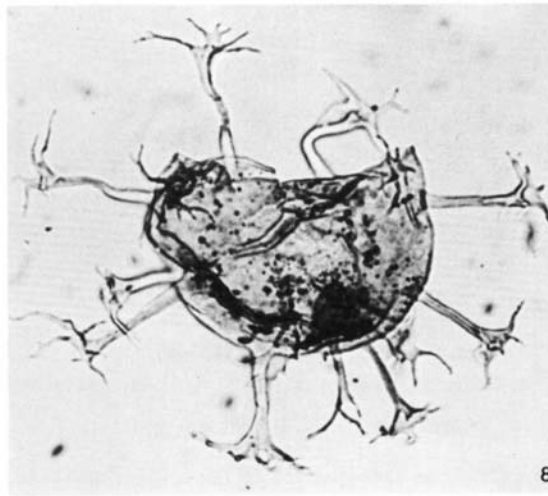
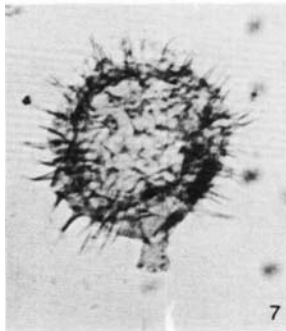
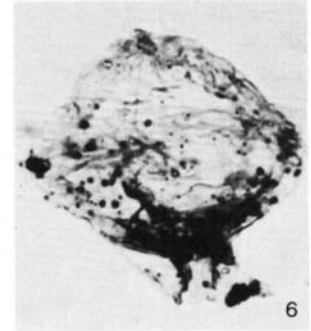
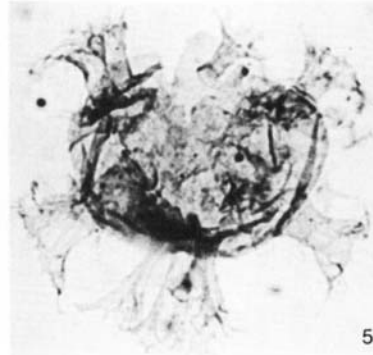
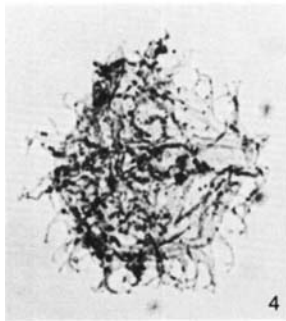
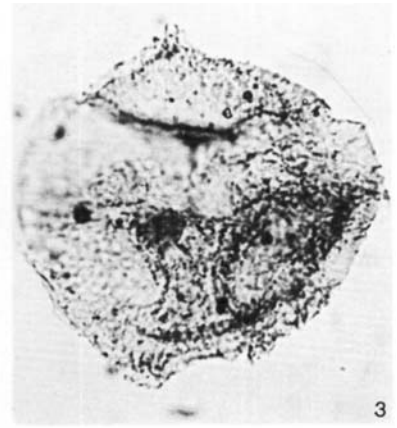
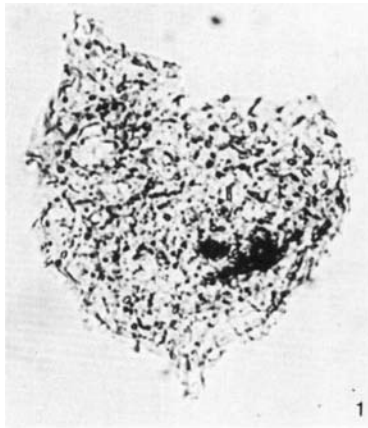
- Fig. 1. *Cicatricosisporites* sp. A. B1a-18, 8240-8300ft., Slide 4, N36/4, AGC 605. (Neocomian).
- Fig. 2. *Tigrisporites* cf. *reticulatus* Singh, 1971. B1-36, 10610-10710ft., Slide 3, K34/0, AGC 606. (Neocomian).
- Fig. 3. Genus and species indet. 1. B1a-18, 3900-4000ft., Slide 4, Q26/1, AGC 607. (Neocomian).
- Fig. 4. Gen. and spec. indet. 2. A1-36, Core 10, 10607-10617ft., Slide 1 unox., U27/3, AGC 608. (Neocomian-Barremian).
- Fig. 5. *Pilosisorites* sp. 2 *sensu* Bebout, 1981. B1a-18, 8240-8300ft., Slide 4, T28/1, AGC 609. (Neocomian-Barremian).
- Fig. 6. *Inaperturopollenites* sp. B1a-18, 3700-3800ft., Slide 4, Y46/1, AGC 610. (Neocomian-Cenomanian).
- Fig. 7. *Cicatricosisporites* sp. B. B1a-18, 3700-3800ft., Slide 4, N39/2, AGC 611. (Neocomian-Aptian).
- Fig. 8. *Aequitiradites spinulosus* (Cookson & Dettman, 1958) Cookson & Dettman, 1961. B1a-18, 7400-7500ft., Slide 4, L35/0-35/4, AGC 612. (Neocomian-Barremian).
- Fig. 9. *Verrucosisporites* sp. B1-36, Core 24, 11173-11181ft., Slide 2, K45/3, AGC 613. (Neocomian).
- Fig. 10. *Contignisporites* sp. B1a-18, 4700-4800ft., Slide 4, Y25/0, AGC 614. (Neocomian).
- Fig. 11. *Araucariacites australis* Cookson, 1947 ex Couper, 1953. B1a-18, 5400-5500ft., Slide 4, V37/4, AGC 615. (Neocomian-Cenomanian).





**Explanation of Plate 56**All figures are  $\times 500$ 

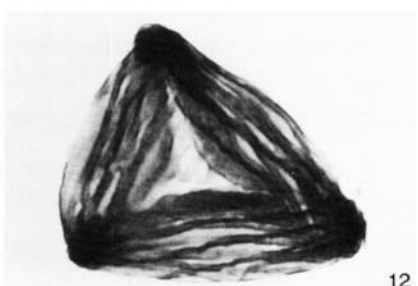
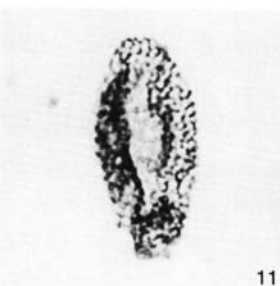
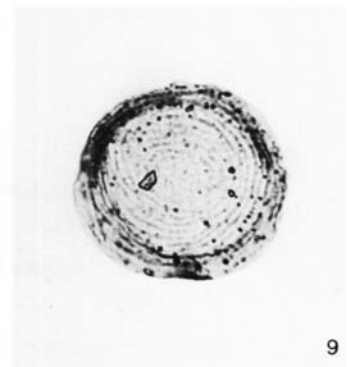
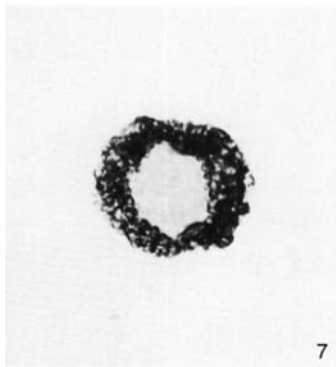
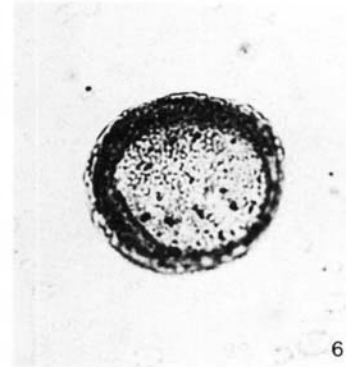
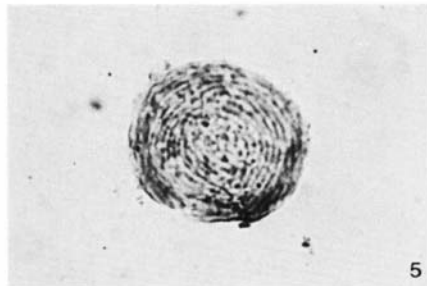
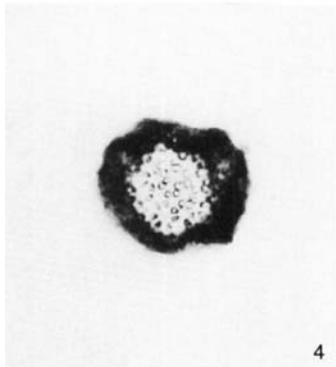
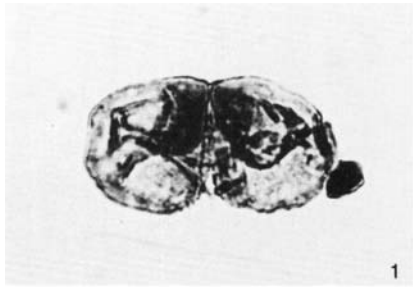
- Fig. 1. *Cyclonephelium distinctum* Deflandre & Cookson, 1955. A1-45, 10510-10700ft., Slide 3, V32/1, AGC 616. (Neocomian-Albian).
- Fig. 2. *Spiniferites ramosus* (Ehrenberg, 1938) Loeblich & Loeblich, 1966. R3-82, 3658m., Slide 1, Q32/0, AGC 617. (Neocomian-Albian).
- Fig. 3. *Cyclonephelium vannophorum* Davey, 1969. A1-45, 9710-9900ft., Slide 3, H47/2, AGC 618. (Neocomian-Cenomanian).
- Fig. 4. *Hystrichodinium furcatum* Alberti, 1961. A1-45, 9710-9900ft., Slide 2, N41/1, AGC 619. (Late Neocomian-Barremian).
- Figs. 5, 10. *Oligosphaeridium perforatum* (Gocht, 1959) Davey & Williams, 1969. 5. R3-82, 4415 m., Slide 1, S43/4, AGC 620. 10. R3-82, 3784 m., Slide 1, U32/1, AGC 621. (Late Neocomian-Albian).
- Fig. 6. *Glabridinium apatelum* (Cookson & Eisenack, 1960) Brideaux, 1977. A1-36, 10607-10617ft., Slide 1, J28/4, AGC 622. (Neocomian-Barremian).
- Fig. 7. *Coronifera oceanica* Cookson & Eisenack, 1958, emend. May, 1980. A1-NC 92, 6200-6210ft., Slide 4, S37/2, AGC 623. (Late Neocomian-Albian).
- Figs. 8, 11. *Oligosphaeridium complex* (White, 1842) Davey & Williams, 1966. 8. A1-45, 10920-11100ft., Slide 2, T33/1, AGC 624. 11. A1-45, 9710-9900ft., Slide 3, O39/1, AGC 625. (Late Neocomian-Albian).
- Fig. 9. *Gardodinium eisenackii* Alberti, 1961. B1-36, 10734-10738ft., Slide 3, E34/0, AGC 626. (Late Neocomian-Barremian).
- Fig. 12. *Aptea anaphrissa* (Sarjeant, 1966), Benedek, 1972. A1-NC 92, 6100-6110ft., Slide 5, P26/0, AGC 627. (Barremian).



### Explanation of Plate 57

All figures are  $\times 500$

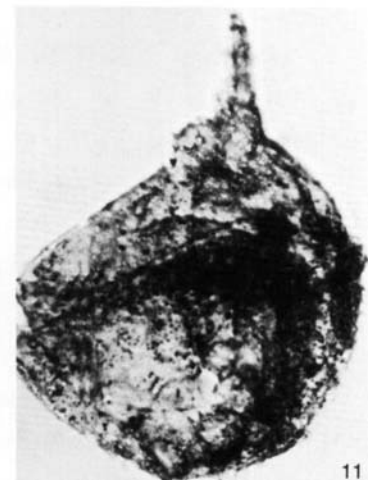
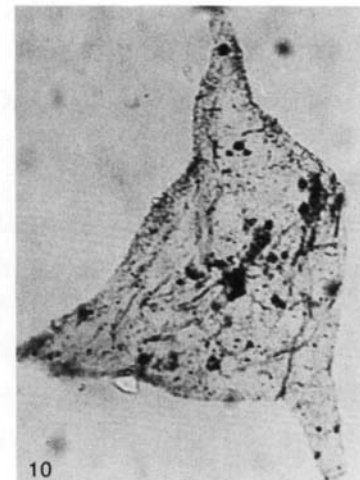
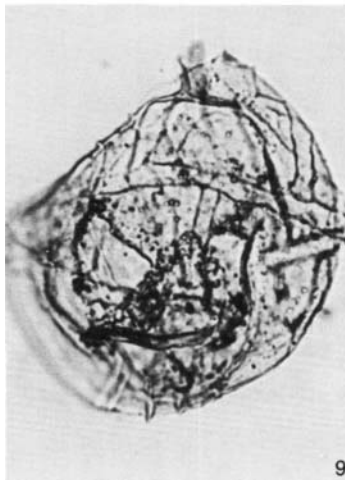
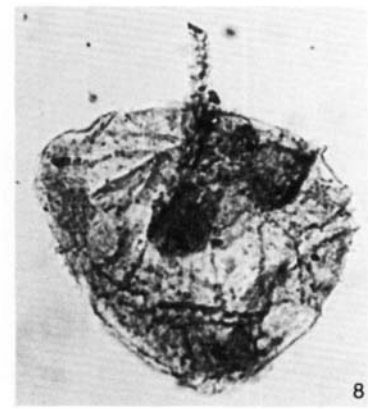
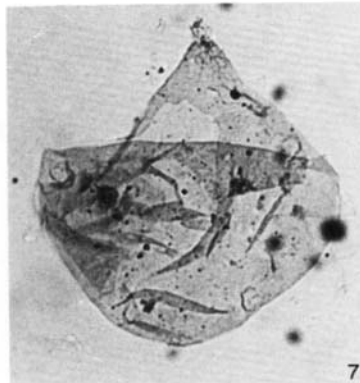
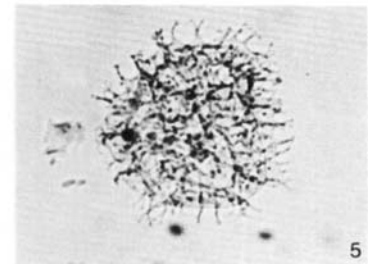
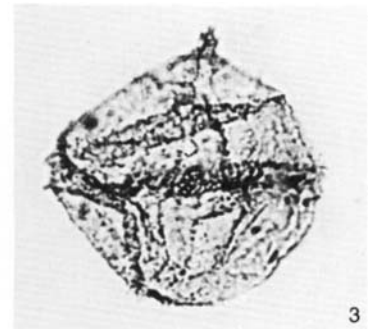
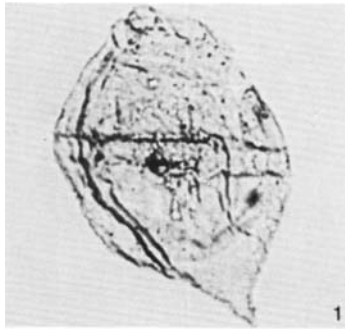
- Figs. 1, 3. *Dicheiropollis etruscus* Trevisian, 1972. 1. GGG1-59, Core 11, 11382ft., Slide 4, H25/0, AGC 628. 3. GGG1-59, Core 11, 11382ft., Slide 4, F27/0, AGC 629. (Late Neocomian-Barremian).
- Fig. 2. *Cycadopites* sp. A1-36, Core 10, 10607-10617ft., Slide 1 unox., N30/0, AGC 630. (Neocomian-Cenomanian).
- Figs. 4, 7. *Stellatopollis* cf. *barghoornii* Doyle in Doyle *et al.*, 1976. 4. proximal side, 7. distal side, L1-82, 3695-3707ft., Slide 4, Q35/3, AGC 631. (Barremian-Aptian).
- Figs. 5, 9. *Chomotriletes minor* (Kedves, 1961), Pocock, 1970. 5. B1-36, Core 22, 10734-10738ft., Slide 3, R26/4-27/3 – S26/2-27/1, AGC 632. 9. B1-36, 10610-10710ft., Slide 2, O40/0, AGC 633. (Neocomian-Albian).
- Fig. 6. “*Inaperturopollenites*” *crisopolensis* Regali *et al.*, 1975. G1-2, 7170-7210ft., Slide 2, O30/0, AGC 634. (Late Barremian-Aptian).
- Fig. 8. *Retimonocolpites* sp. A. A1-NC92, 6200-6210ft., Slide 4, M26/0, AGC 635. (Barremian-Cenomanian).
- Fig. 10. *Appendicisporites* cf. *potomacensis* Brenner, 1963. B1a-18, 4700-4800ft., Slide 4, O45/1, AGC 636. (Barremian-Aptian).
- Fig. 11. *Retimonocolpites* sp. B. R3-82, 4209m., Slide 1, W35/3, AGC 637. (Barremian-Cenomanian).
- Fig. 12. *Appendicisporites* sp. cf. A. *bifurcatus* Singh, 1964. R3-82, 4118m., Slide 1, N25/2, AGC 638. (Barremian-Aptian).



### Explanation of Plate 58

All figures are  $\times 500$

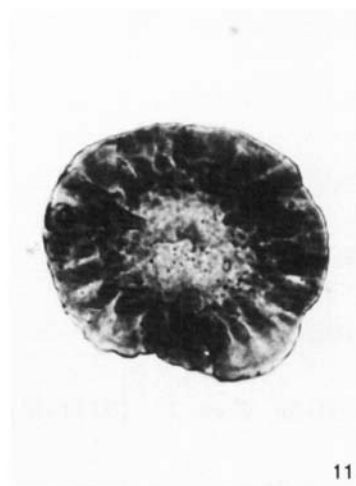
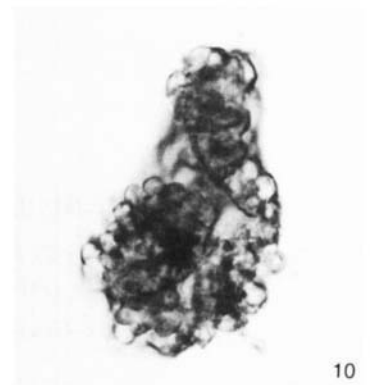
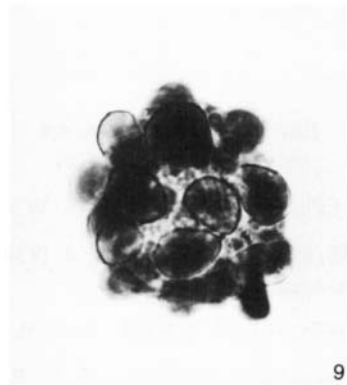
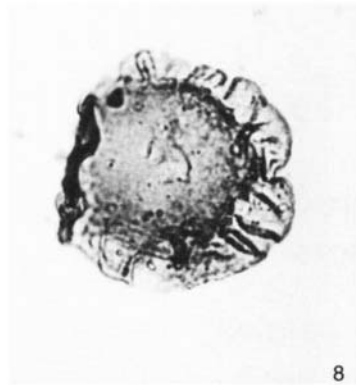
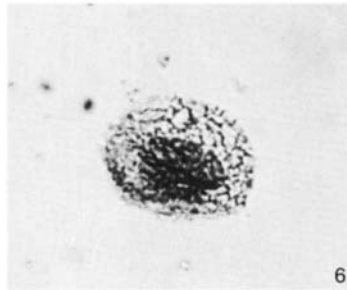
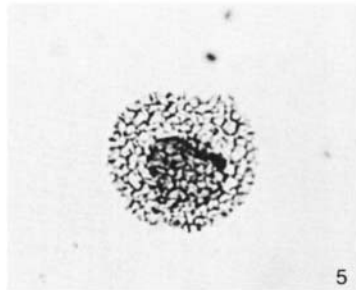
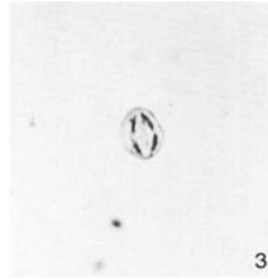
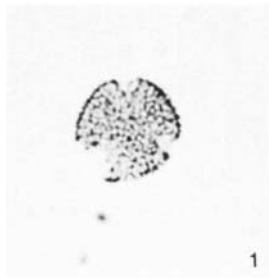
- Figs. 1, 2. *Subtilisphaera pirnaensis* (Alberti, 1959) Jain & Millepied, 1973. 1. A1-45, 10510-10700ft., Slide 3, U28/2, AGC 639. 2. A1-45, 12100-12250ft., Slide 3, N38/3, AGC 640. (Aptian-Albian).
- Fig. 3. *Millioudodinium episomum* (Sarjeant, 1966) Stover & Evitt, 1978. A1-45, 11110-11300ft., Slide 3, M47/1, AGC 641. (Aptian).
- Fig. 4. *Subtilisphaera senegalensis* Jain & Millepied, 1973. A1-45, 10110-10300ft., Slide 2, N34/0, AGC 642. (Aptian-Albian).
- Fig. 5. *Spiniferites ramosus* (Ehrenberg, 1938) Loeblich & Loeblich, 1966. A1-45, 12100-12250ft., Slide 3, O30/0, AGC 643. (Neocomian-Albian).
- Fig. 6. *Cribroperidinium* cf. *edwardsii* (Cookson & Eisenack, 1958) Davey, 1969. B1a-18, 4400-4500ft., Slide 4, K40/1, AGC 644. (Aptian-Albian).
- Fig. 7. ?*Lagenorhytis* sp. A. A1-NC 92, 6640-6650ft., Slide 6, K36/3, AGC 645. (? Aptian).
- Figs. 8, 9. *Cribroperidinium edwardsii* (Cookson & Eisenack, 1958) Davey, 1969. 8. A1-36, 7870-7880ft., Slide 4, N34/0, AGC 646. 9. A1-45, 9910-10100ft., Slide 2, U40/2, AGC 647. (Aptian-Albian).
- Fig. 10. *Pseudoceratium regium* Singh, 1971. A1-45, 12100-12250ft., Slide 3, K26/4, AGC 648. (Aptian).
- Fig. 11. *Cribroperidinium* sp. A. A1-36, 7870-7880ft., Slide 3, K38/1, AGC 649. (Aptian-Albian).



**Explanation of Plate 59**All figures are  $\times 500$ 

- Fig. 1. *Retitricolpites vulgaris* Pierce, 1961. A1-NC 92, 6200-6210ft., Slide 4, P34/4, AGC 650. (Aptian-Cenomanian).
- Fig. 2. *Psilatricolpites* sp. A1-NC 92, 6200-6210ft., Slide 4, S35/0, AGC 651. (Aptian-Cenomanian).
- Fig. 3. *Eucomiidites* sp. A1-NC 92, 6200-6210ft., Slide 4, M26/0, AGC 652. (Barremian-Cenomanian).
- Fig. 4. *Ephedripites* sp. A. A1-NC 92, 6200-6210ft., Slide 4, W23/3, AGC 653. (Barremian-Cenomanian).
- Figs. 5, 6. *Afropollis* sp. 5. A1-NC 92, 6200-6210ft., Slide 4, Y23/3, AGC 654. 6. A1-NC 92, 6200-6210ft., Slide 4, X25/3, AGC 655. (Aptian-earliest Cenomanian).
- Fig. 7. *Classopollis* sp. ( $30\mu$ ) A1-28, 7613 ft., Slide 2, P33/3, AGC 656. (Aptian-Albian).
- Figs. 8, 11. *Callialasporites dampieri* (Balme, 1957) Sukh Dev, 1961. 8. A1-NC 92, 6630-6640ft., Slide 3, T37/3, AGC 657. 11. B1a-18, 7300-7400ft., Slide 4, T45/0, AGC 658. (Neocomian-Aptian).
- Fig. 9. cf. *Trilites* sp. A1-36, Core 8, 9600-9611 ft., Slide 1 unox., Y30/0, AGC 659. (Aptian-Albian).
- Fig. 10. *Reyrea polymorpha* Hengreen, 1973. A1-36, 7870-7880ft., Slide 4, V35/2, AGC 660. (Aptian-Albian).
- Fig. 12. *Ephedripites* sp. B. A1-NC 92, 6200-6210ft., Slide 4, X32/3-Y32/1, AGC 661. (Aptian-Albian).
- Fig. 13. *Callialasporites trilobatus* (Balme, 1957) Sukh Dev, 1961. A1-NC 92, 6700-6710ft., Slide 4, T36/2, AGC 662. (Neocomian-Aptian).





**Explanation of Plate 60**All figures are  $\times 500$ 

- Fig. 1. *Tricolpites* sp. A. A1-NC 92, 6200-6210ft., Slide 4, V30/3-W30/1, AGC 663. (Albian-Cenomanian).
- Figs. 2, 3. cf. *Nyssapollenites* sp. 2. A1-NC 92, 6200-6210ft., Slide 4, N34/0, AGC 664. 3. A1-NC 92, 6200-6210ft., Slide 4, F29/0, AGC 665. (Albian-Cenomanian).
- Fig. 4. *Classopollis brasiliensis* Herngreen, 1975. A1-35, 10300-10348ft., Slide 1, G34/1, AGC 666. (Cenomanian).
- Fig. 5. *Elaterocolpites castelainii* Jardiné & Magloire, 1965. G1-2, 7170-7210ft., Slide 2, G34/0-34/3, AGC 667. (Albian).
- Fig. 6. *Valensiella ovula* (Deflandre, 1947) Eisenack, 1963. R3-82, 3416m., Slide 1, V32/0, AGC 668. (Albian-Cenomanian).
- Fig. 7. *Elaterosporites klaszii* (Jardiné & Magloire, 1965) Jardiné, 1967. G1-2, 7170-7210ft., Slide 2, U26/0, AGC 669. (Albian).
- Fig. 8. *Xenascus ceratioides* (Deflandre, 1937) Lentin & Williams, 1973. B1-36, 10734-10738ft., Slide 3, U36/4, AGC 670. (Albian-Cenomanian).
- Fig. 9. *Pilosisorites trichopapillosus* (Thiergart, 1949) Delcourt & Sprumont, 1955. B1a-18, 6100-6200ft., Slide 4, T32/0, AGC 671. (Neocomian-Albian).
- Fig. 10. *Cyclonephelium vannophorum* Davey, 1969. A1-NC 92, 6300-6310ft., Slide 5, L27/3, AGC 672. (Neocomian-Cenomanian).
- Fig. 11. *Sofrepites legouxae* Jardiné, 1967. (Contamination? Drilling Mud?) B1-36, Core 22, 10734-10738ft., Slide 2, U26/0, AGC 673. (Albian).
- Fig. 12. *Coronifera* cf. *oceanica* Cookson & Eisenack, 1958. E1-2, 5100-5200ft., Slide 5, V43/3, AGC 674. (Late Neocomian-Albian).

