

Supplementary Dinocyst Plates for High Arctic late Paleocene and early Eocene dinoflagellate cysts

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10 Below we include 41 plates with supplementary dinocyst plates. These include all photographs of holotypes and paratypes
included in the main manuscript as well as additional photographs showing other species as well as morphological diversity
within species and complexes. In addition to 38 plates with light microscope photographs, this supplement includes 3 plates
with scanning electron microscopy pictures. Codes represent sample codes (core, section and interval following IODP
convention) and England Finder coordinates (light microscope photographs only).

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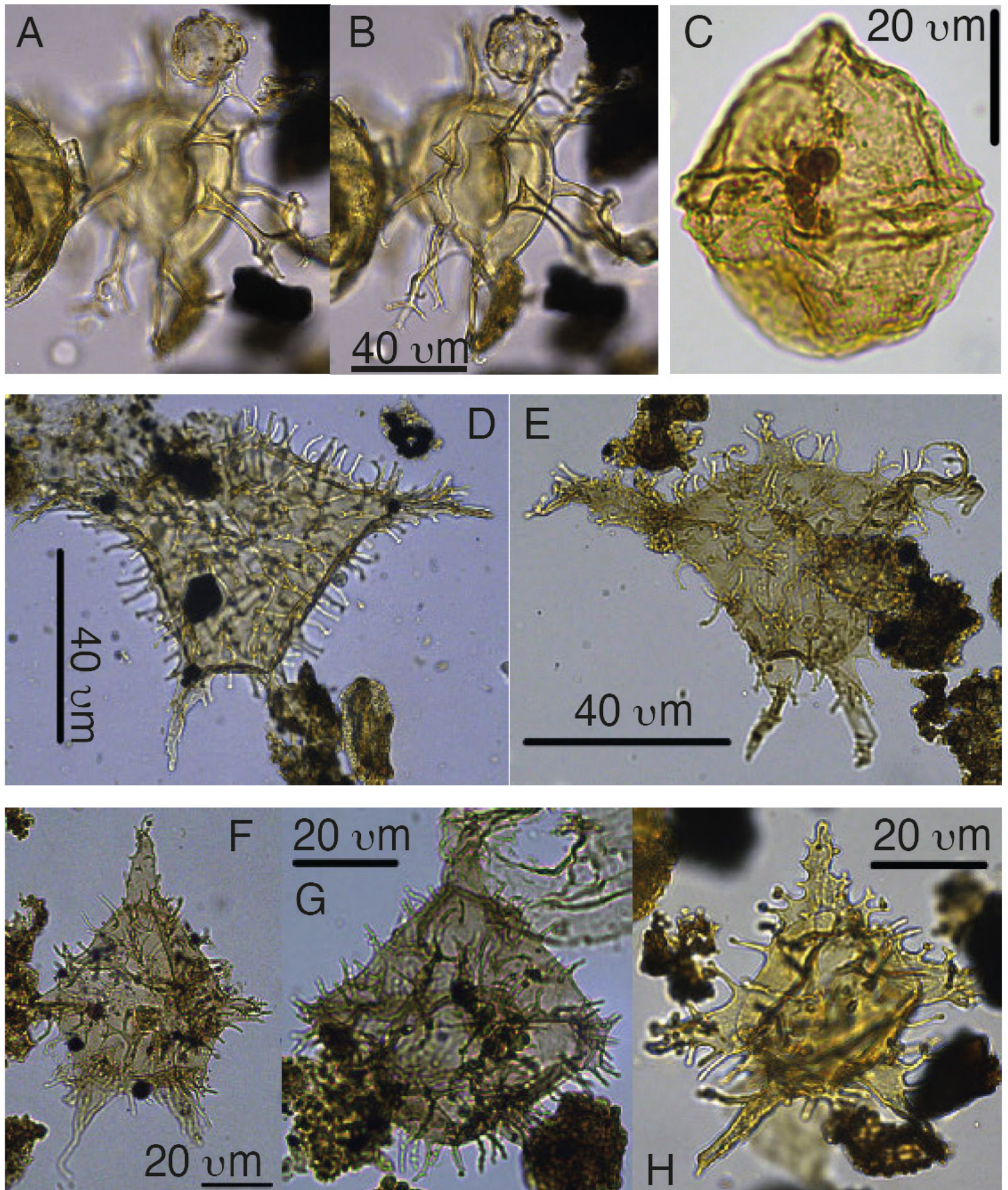
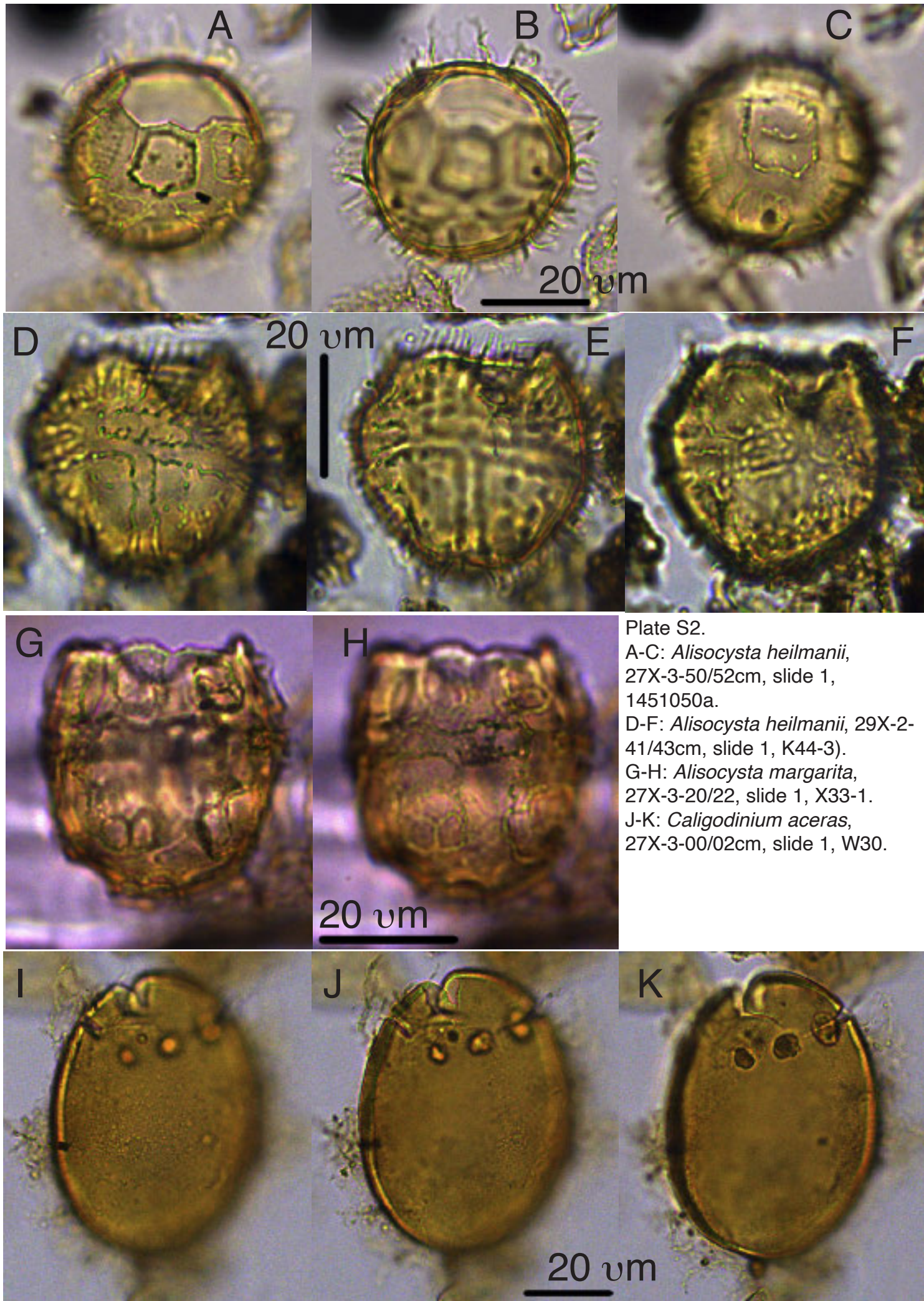
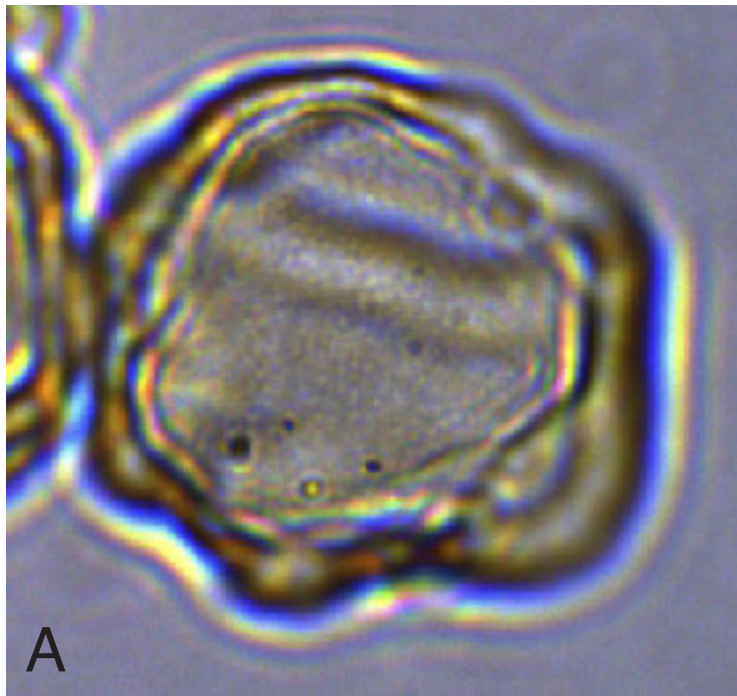


Plate S1. A-B: *Achomosphaera alcornu*, 27X-1-10/12cm, slide 2, H20. C: *Apteodinium* spp., 33X-CC, slide 1, D26. D: *Apectodinium augustum*, 30X-CC, slide 1, T44-1, E: *Apectodinium augustum*, 30X-3-101/103cm, slide 1, R31. F-H: *Apectodinium parvum*, 30X-3-101- 103cm, slide 1, C27-2, 30X-3-101/103cm, slide 1, D26-1, and 30X-1-41/43cm, slide 1, Q30-3.





A

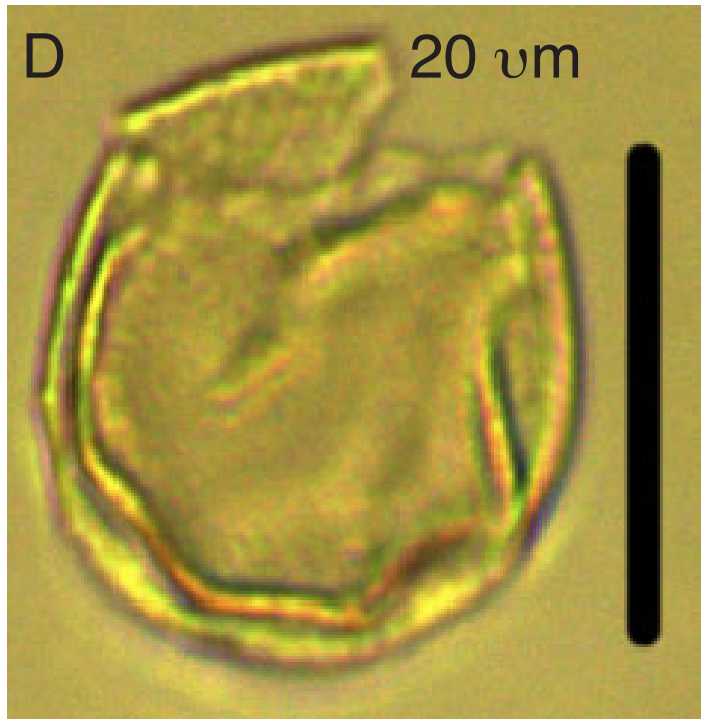


B



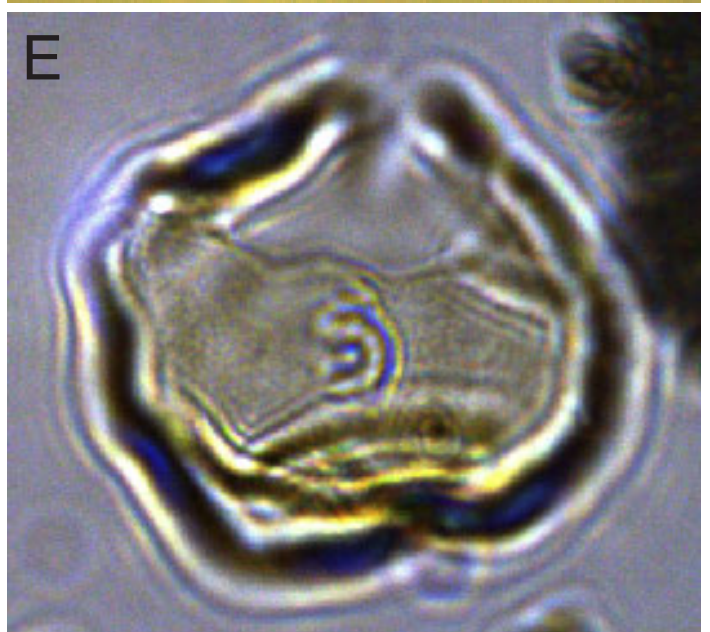
C

20 μ m

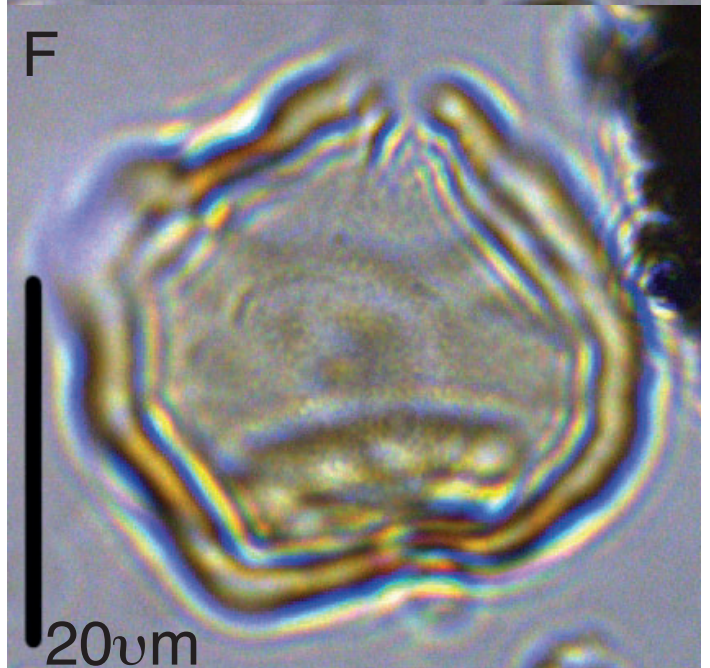


D

20 μ m



E



F

20 μ m

Plate S3. *Batiacasphaera obohikuenobeae*. A-C: Holotype, 27X-2-03/04cm, slide 1, R23-1. D: 27-X-3-30/32cm, slide 1, G-17-4. E-F: Paratype, 27X-2-03/04cm, slide 1, P22-3.

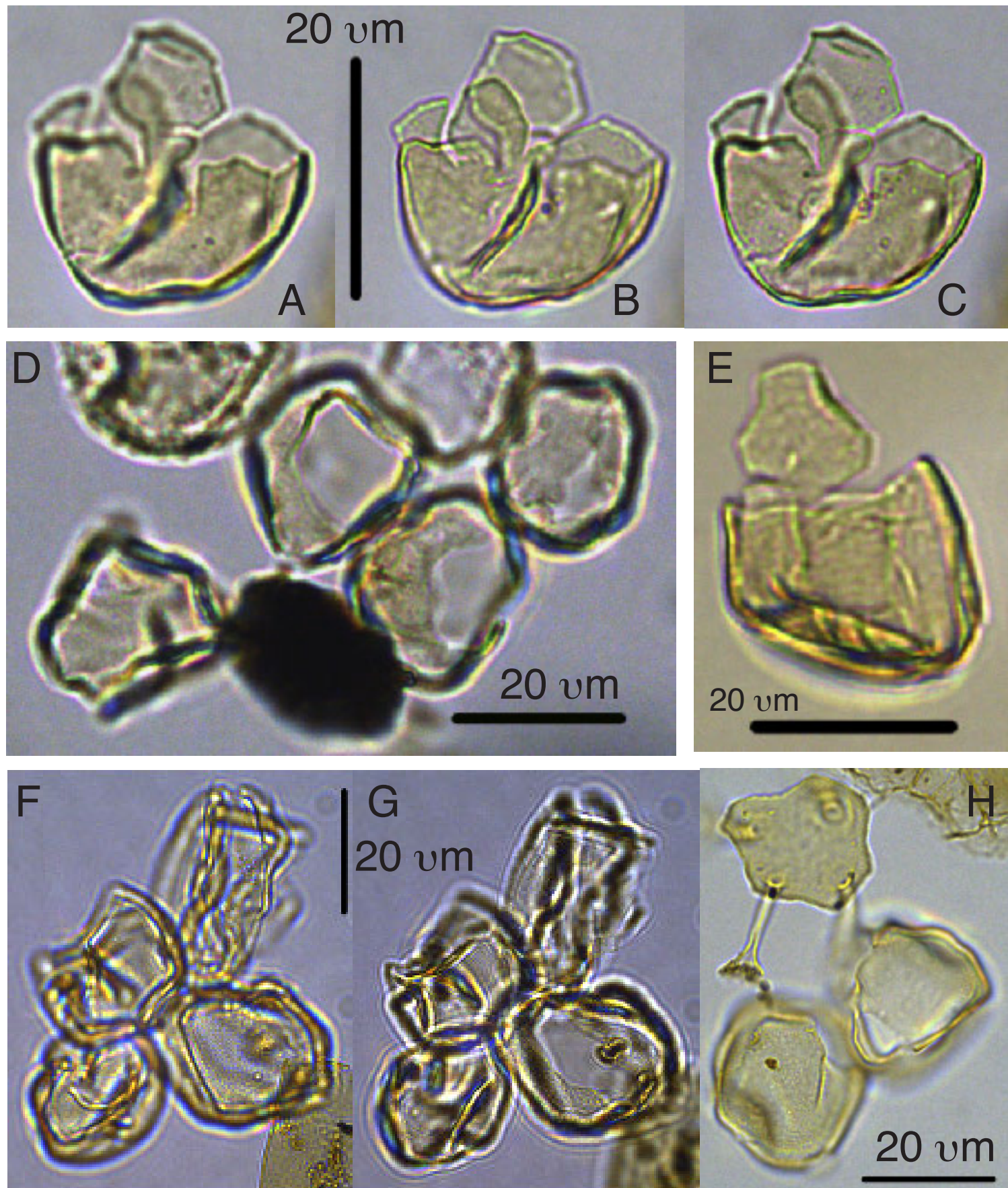


Plate S4. *Batiacasphaera obohikuenobeae*. A-C: 27X-3-90/92cm, slide 1, G24. D: four specimens of *B. obohikuenobeae* together, 27X-2-33/34cm, slide 1, Y44-3. E: 27X-3-50/52cm, slide 1, D28-1). F-G: four specimens of *B. obohikuenobeae* together, 27X-2-03/04cm, slide 1, Q28-1. H: two specimens of *B. obohikuenobeae* and an operculum of *Hystichosphaeridium tubiferum*, 27X-2-03/04cm, slide 1, R22.

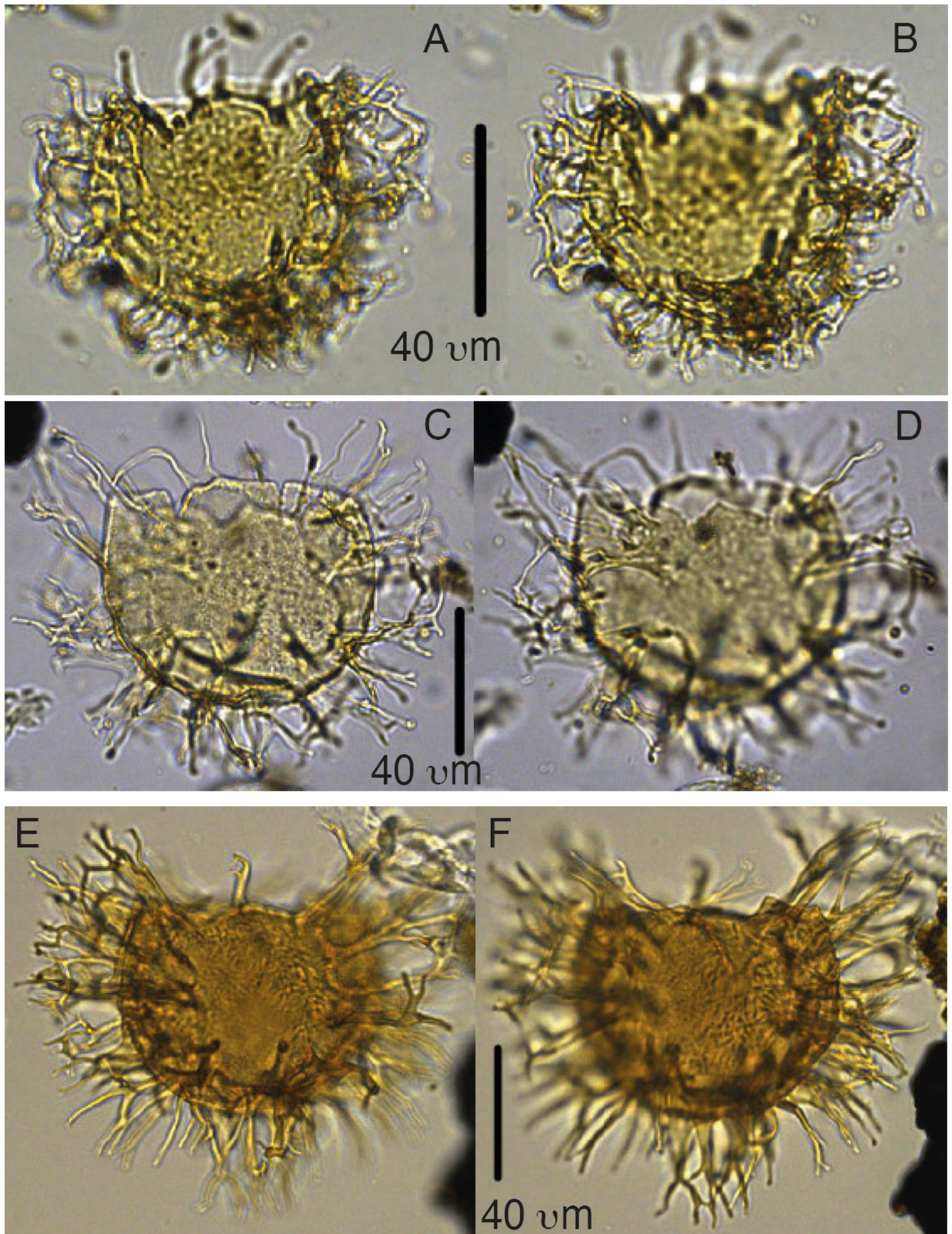


Plate S5. Representatives of the *Areoligera* cpx. #1. A-B: *Areoligera senonensis*, 29X-2-41/43cm, slide 1, C30-3). C-D: *Glaphyrocysta ordinata*, 27X-3-110/112cm, slide 1, E24-1). E-F: *Glaphyrocysta ordinata*, 33X-CC, slide 1, X19-1).

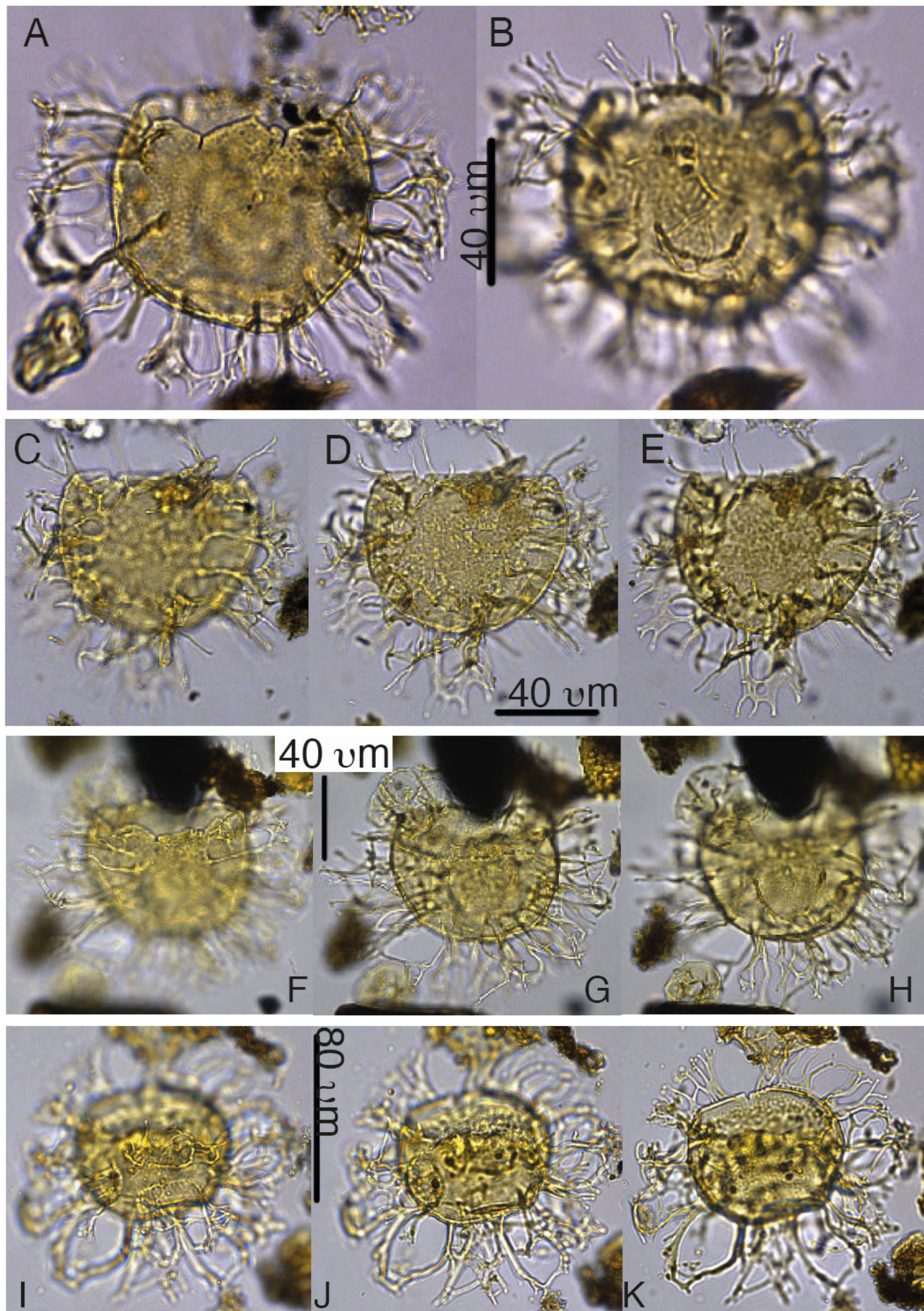


Plate S6. Representatives of the *Areoligera* cpx. All *Glaphyrocysta ordinata*. A-B: 27X-3-50/52cm, slide 1, F230-2. C-E: 27X-3-110/112cm, slide 1, C19. F-H: 27X-3-90/92cm, slide 1, G34. I-K: 29X-2-41/43cm, slide 1, G31.

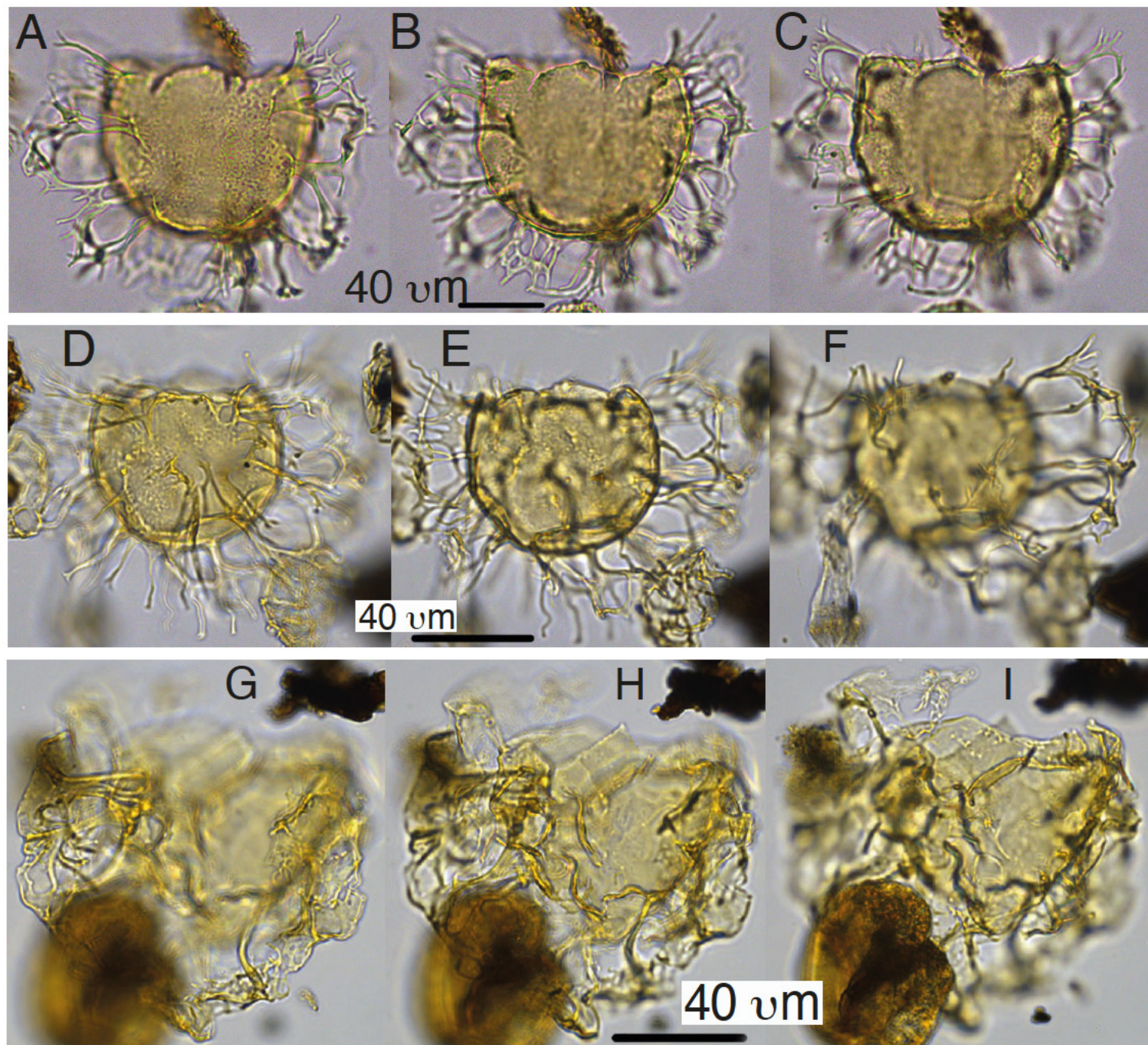


Plate S7. Representatives of the *Areoligera* cpx. A-C: *Glaphyrocysta ordinata*, 27X-3-50/52cm, slide 1, S32-4). D-F: *G. ordinata*, 27X-3-90/92cm, slide 1, H34-1. G-I: *Glaphyrocysta exuberans*, 30X-1-81/83cm, slide 1, D22-1.

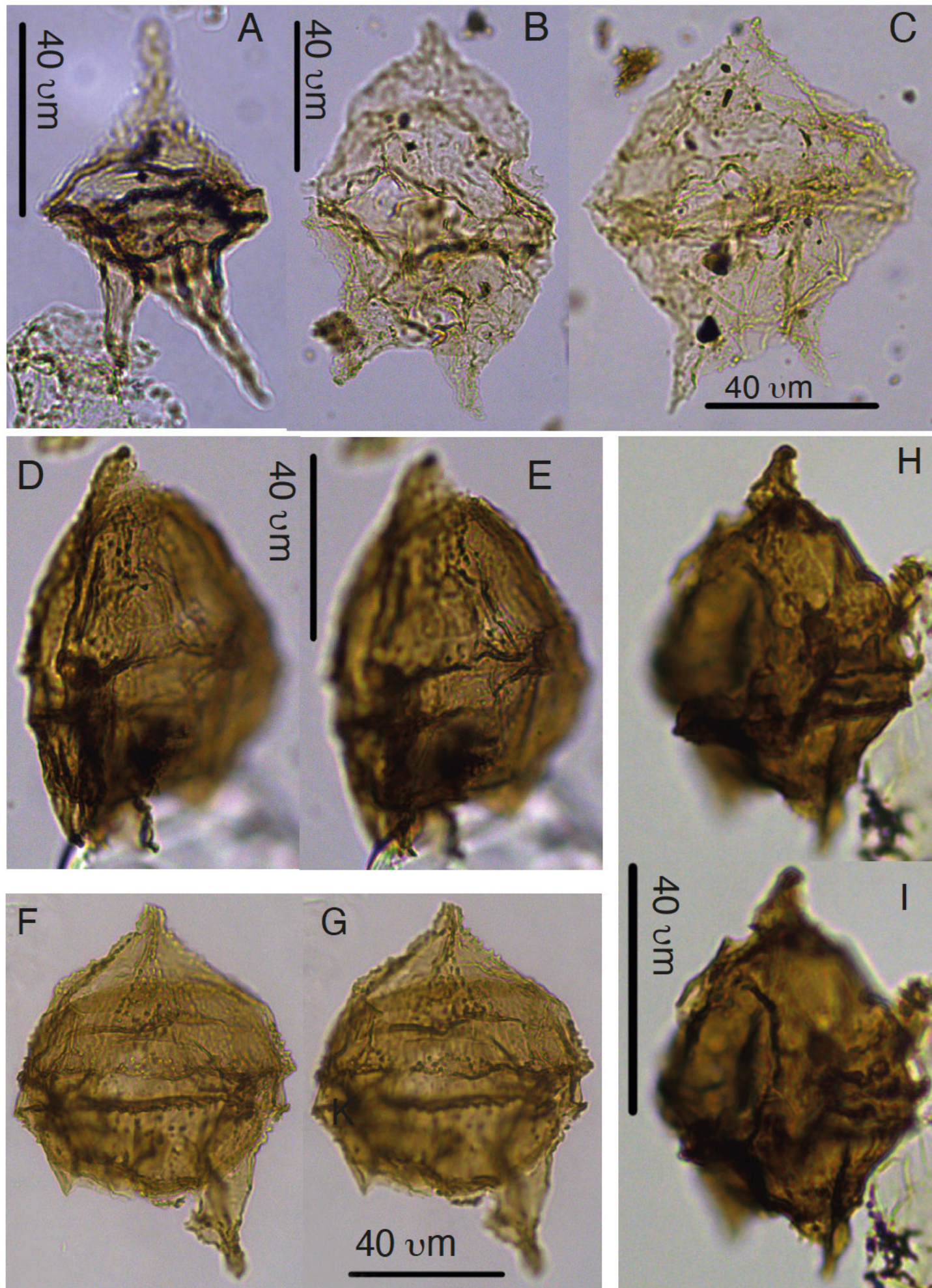


Plate S8. Representatives of the *Cerodinium* cpx. A: *Cerodinium depressum*, 27X-2-20/21cm, slide 1, K37. B-I: *Cerodinium* spp. B: 32X-2-80/83cm, N44, C: 32X-2-80/83cm, slide 1, P34-3, D-E: 33X-CC, slide 1, L13-4, F-G: 33X-CC, slide 1, J18, and H-I: 27X-2-33/34cm, slide 1, T29-4.

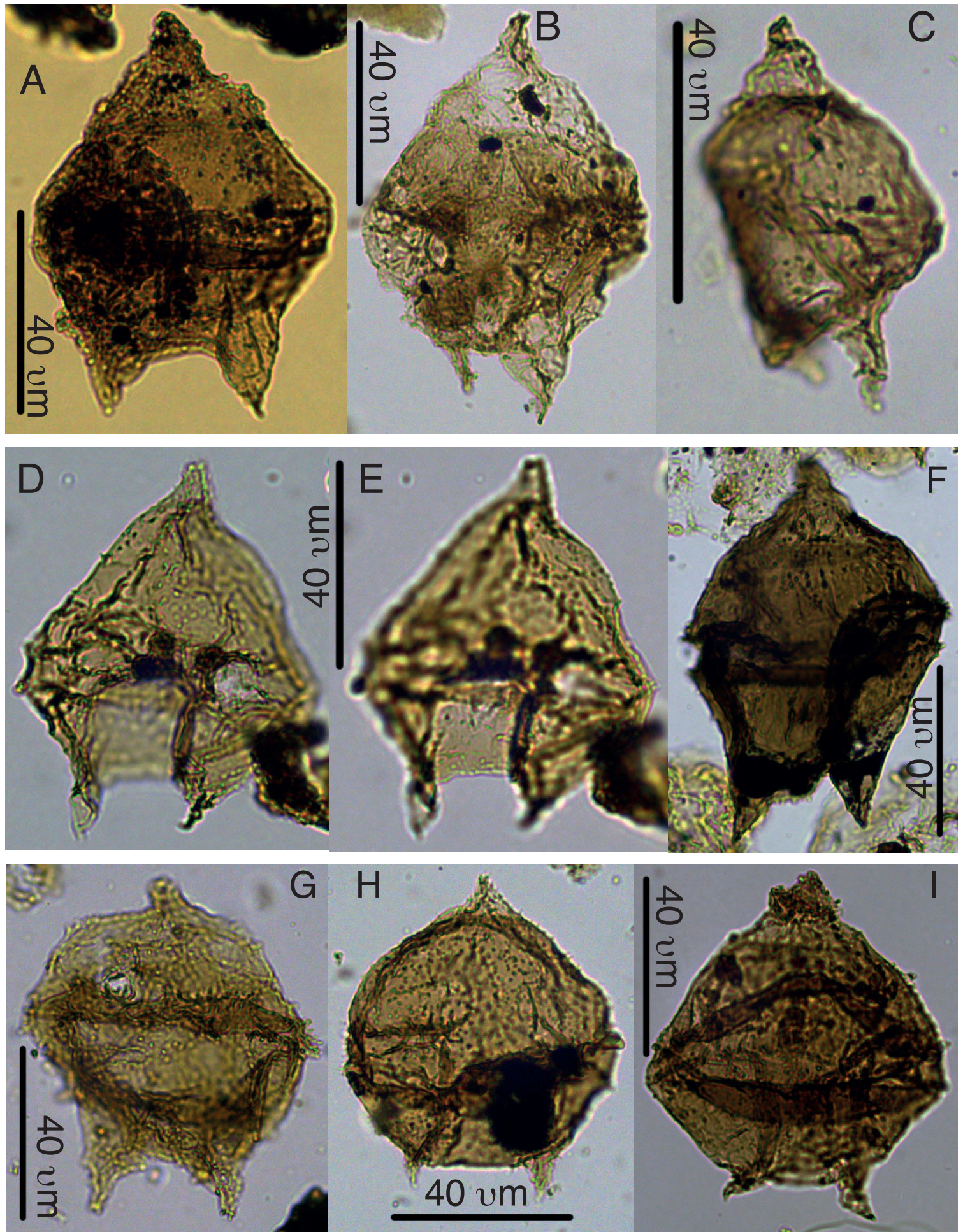


Plate S9. Representatives of the *Cerodinium* cpx.. A-I: *Cerodinium* spp. A: 30X-3-21/23cm, slide 1, H38-3, B: 32X-2-80/83cm, slide 1, W44, C: 27X-CCS, slide 1, M34-3, D-E: 27X-3-61/63cm, slide 1, F36-3, F: 27X-CC, slide 1, F18-1, G: 32X-2-80/83, slide 1, N37, H: 27X-CCS, slide 1, F30-2, and I: 27X-3-101/103cm, slide 1, E35.

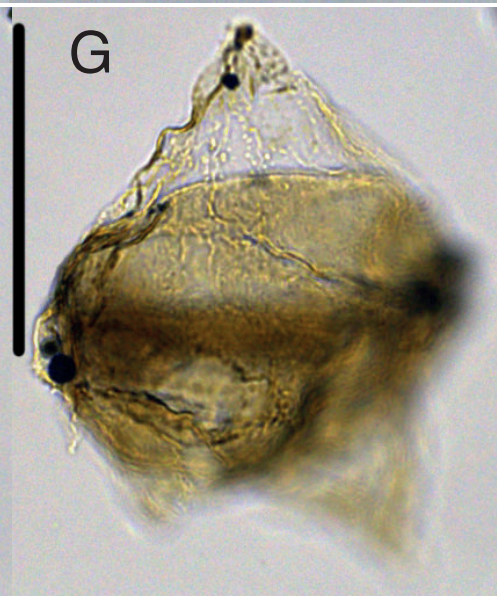
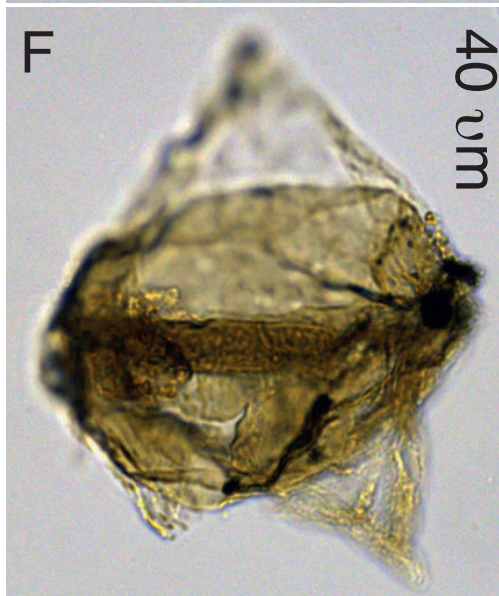
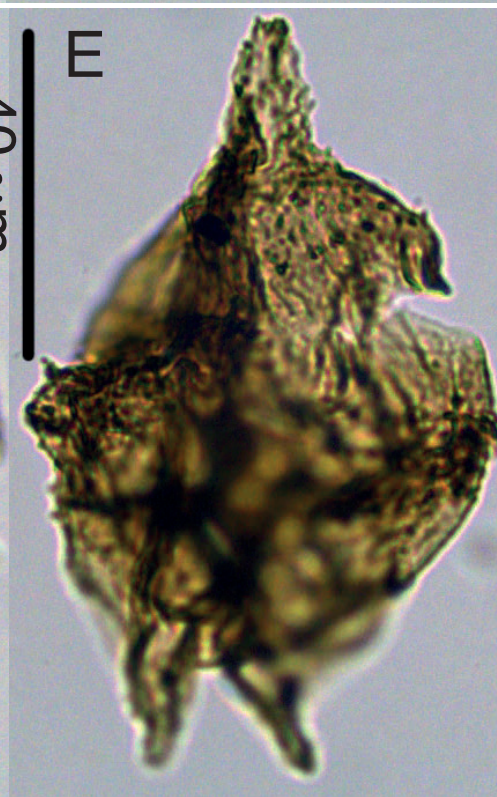
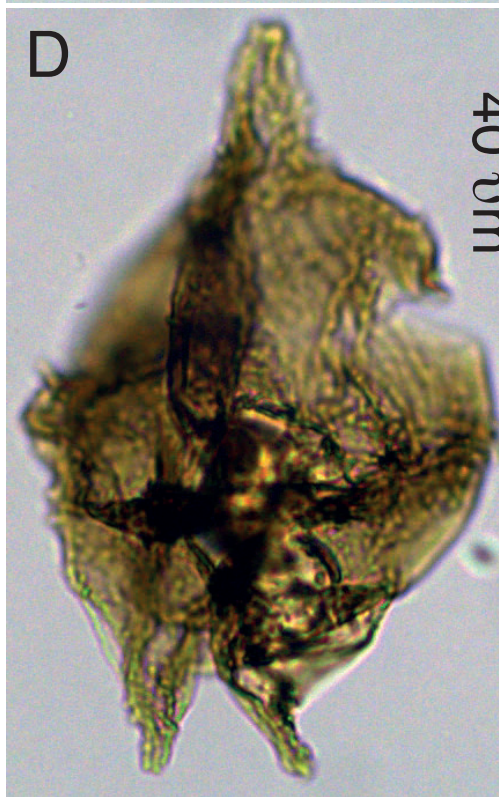
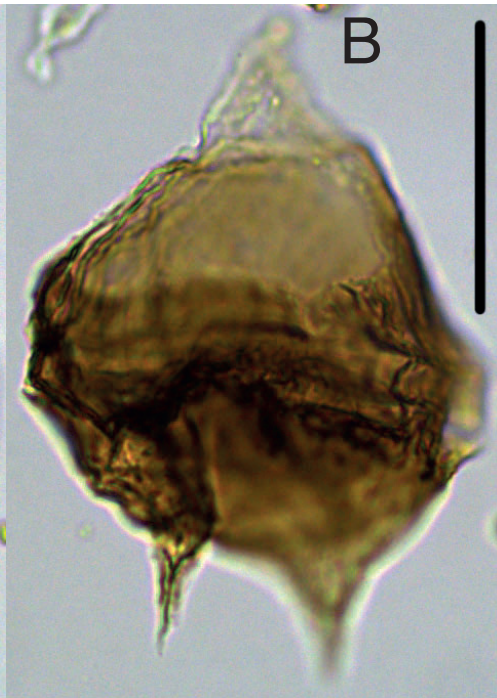
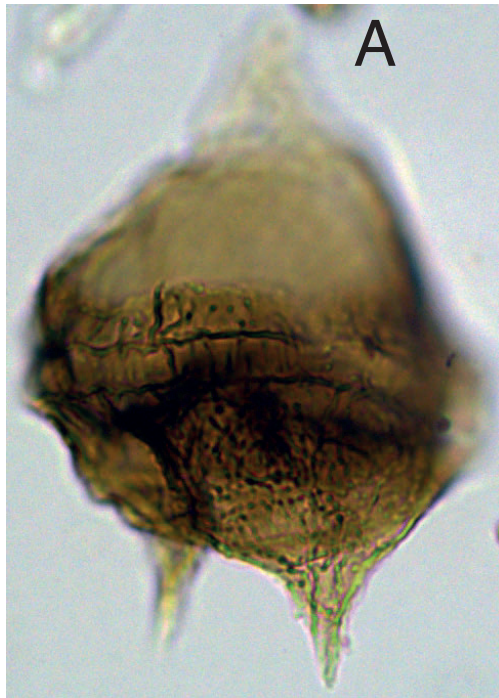


Plate S10. Representatives of the *Cerodinium* cpx.; *Cerodinium warde-nense* types. A-C: 27X-3-110/112 cm, slide 1, F18-01, D-E: 32X-CC, slide 1, F12-1, F-G: 27X-1-100/102cm, slide 1, G19.

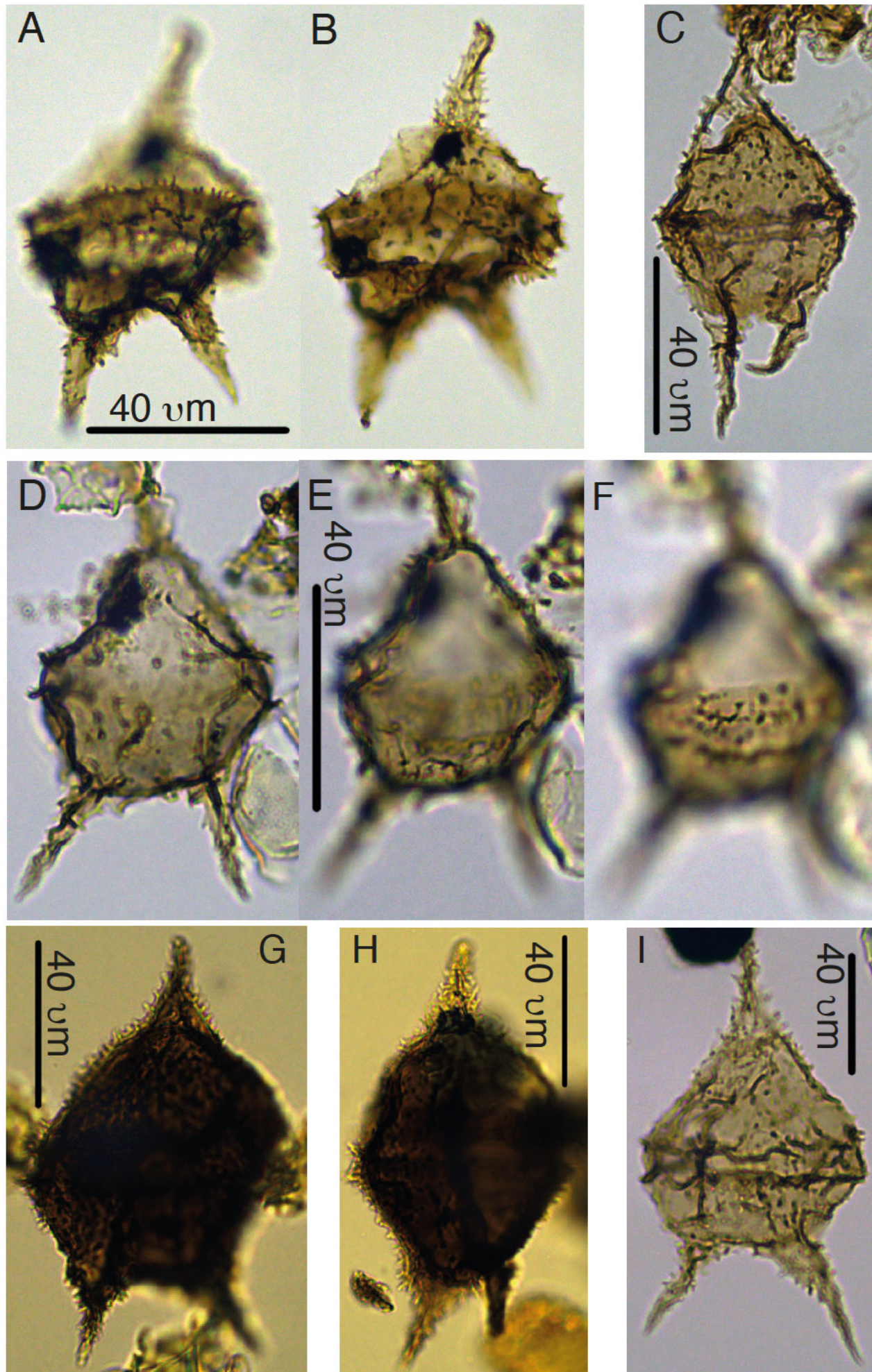


Plate S11. Representatives of the *Cerodinium* cpx.; denticulate types. A-B: 27X-2-14/16cm, slide 1, W45, C: 27X-2-33/34cm, slide 1, Q35, D-F: 27X-2-14/16cm, slide 1, K39, G: 27X-3-10/12, slide 1, E19-3, H: 27X-3-30/32cm, slide 1, E30-1, I: 27X-2-00/01cm, slide 1, B22-3.

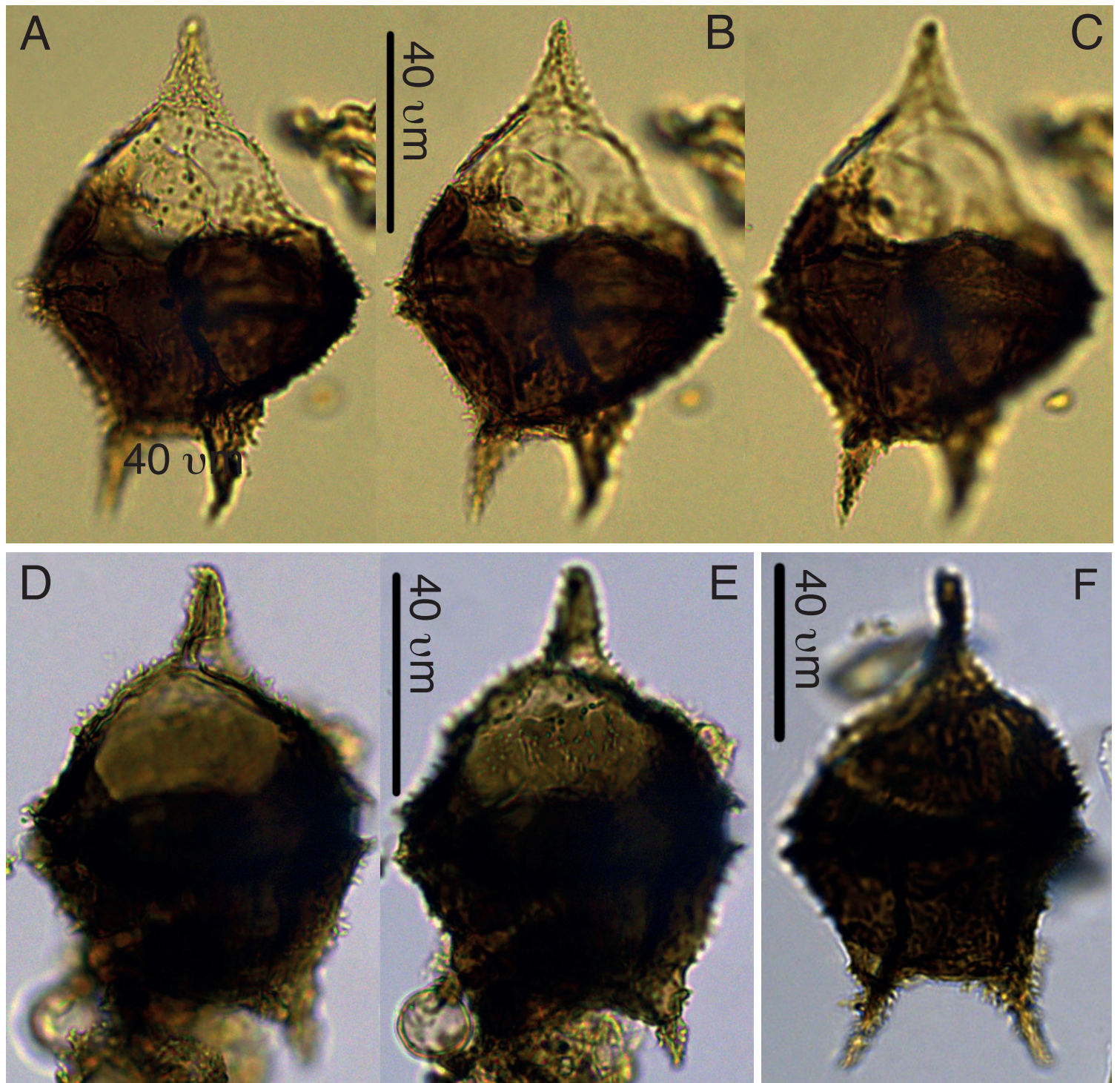
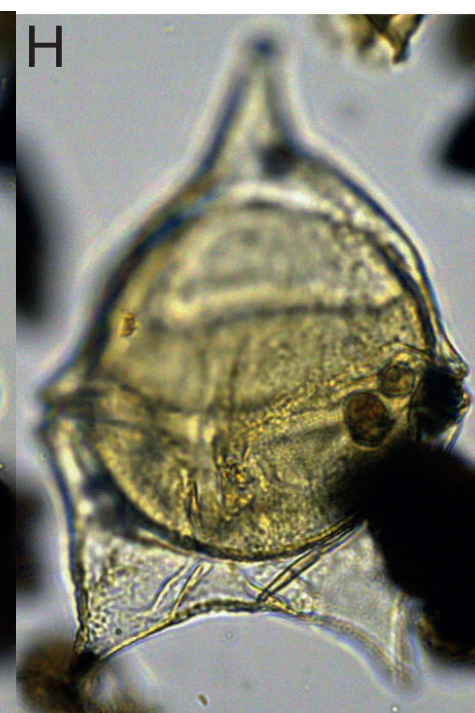
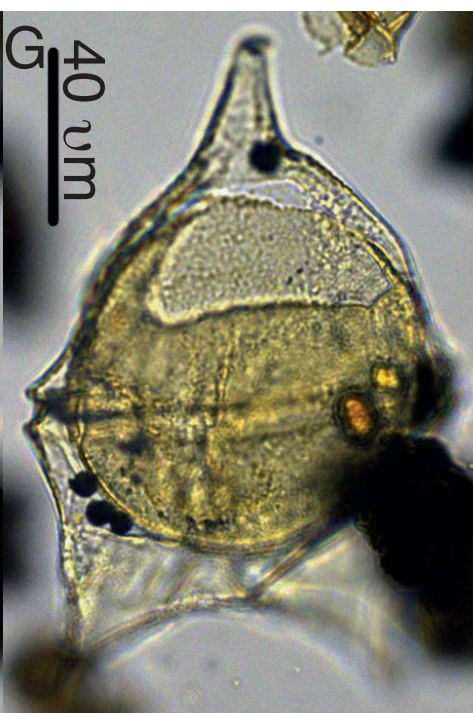
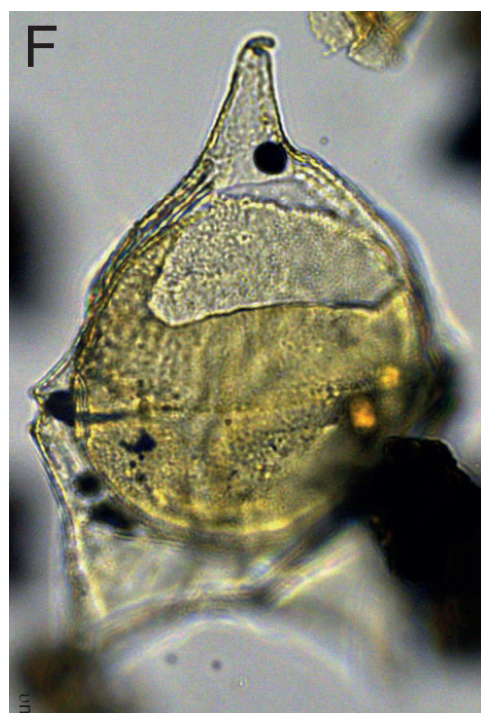
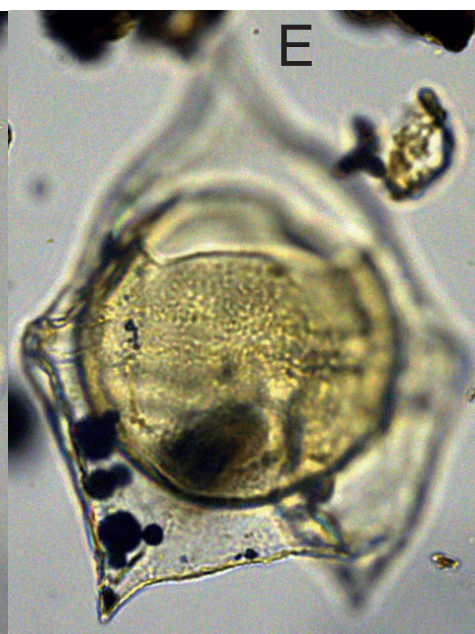


Plate S12. Representatives of the *Cerodinium* cpx; denticulate types. A-C: 27X-3-10/12cm, slide 1, E19-1. D-E: 27X-3-10/12cm, slide 1, E22-2. F: 27X-3-50/52cm, slide 1, F32-2.



Plate S13.
Representatives of the
Cerodinium cpx. #6. A:
Deflandrea oebisfeldensis,
27X-2-0/C1cm, slide 1,
K45-3. B: *D. oebisfelden-*
sis, 27X-2-0/1cm, slide 1,
C30-3. C-E: *Deflandrea*
phosphoritica,
27X-1-00/02cm, slide 1,
K25. F-H: *D. phosphoritica*,
27X-1-0/2cm, slide 1, K30.



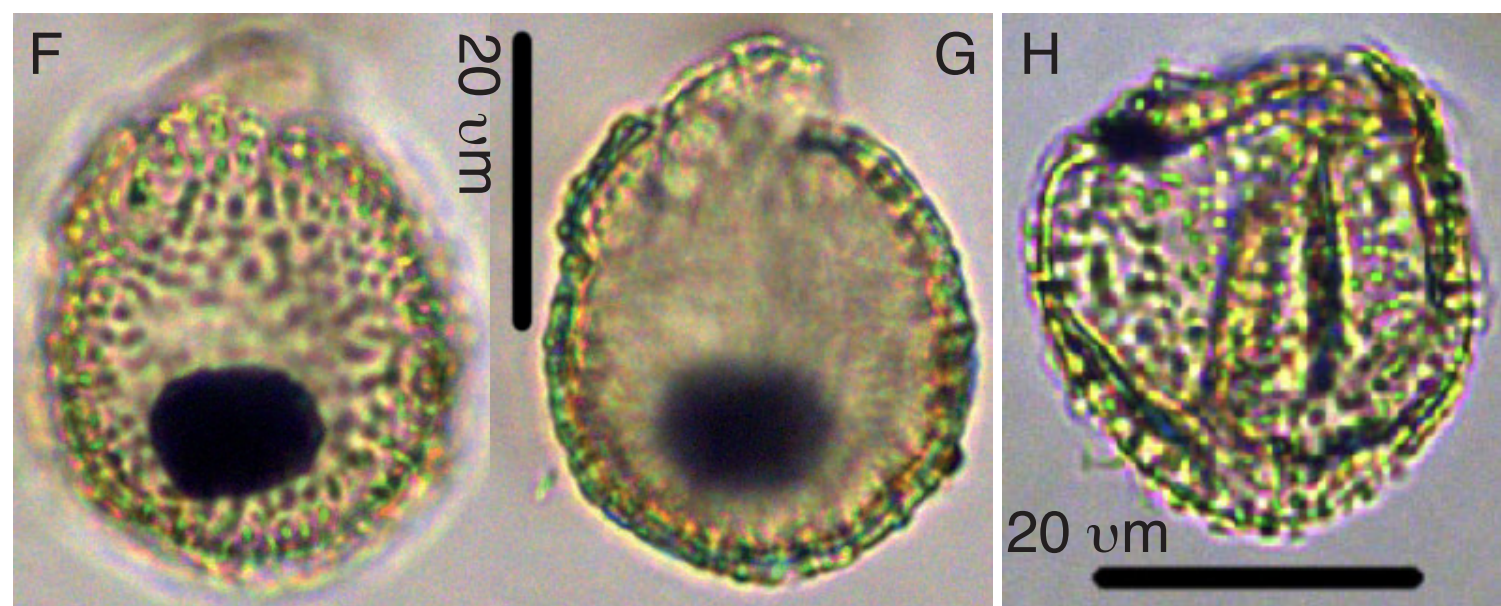
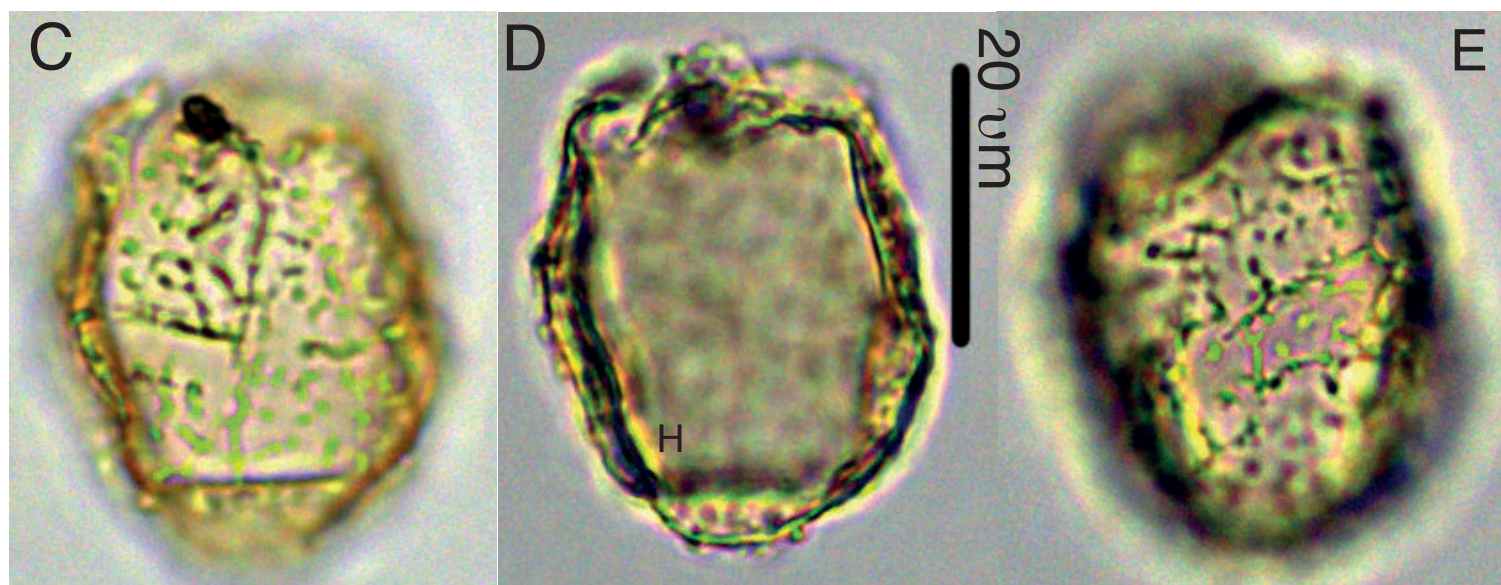
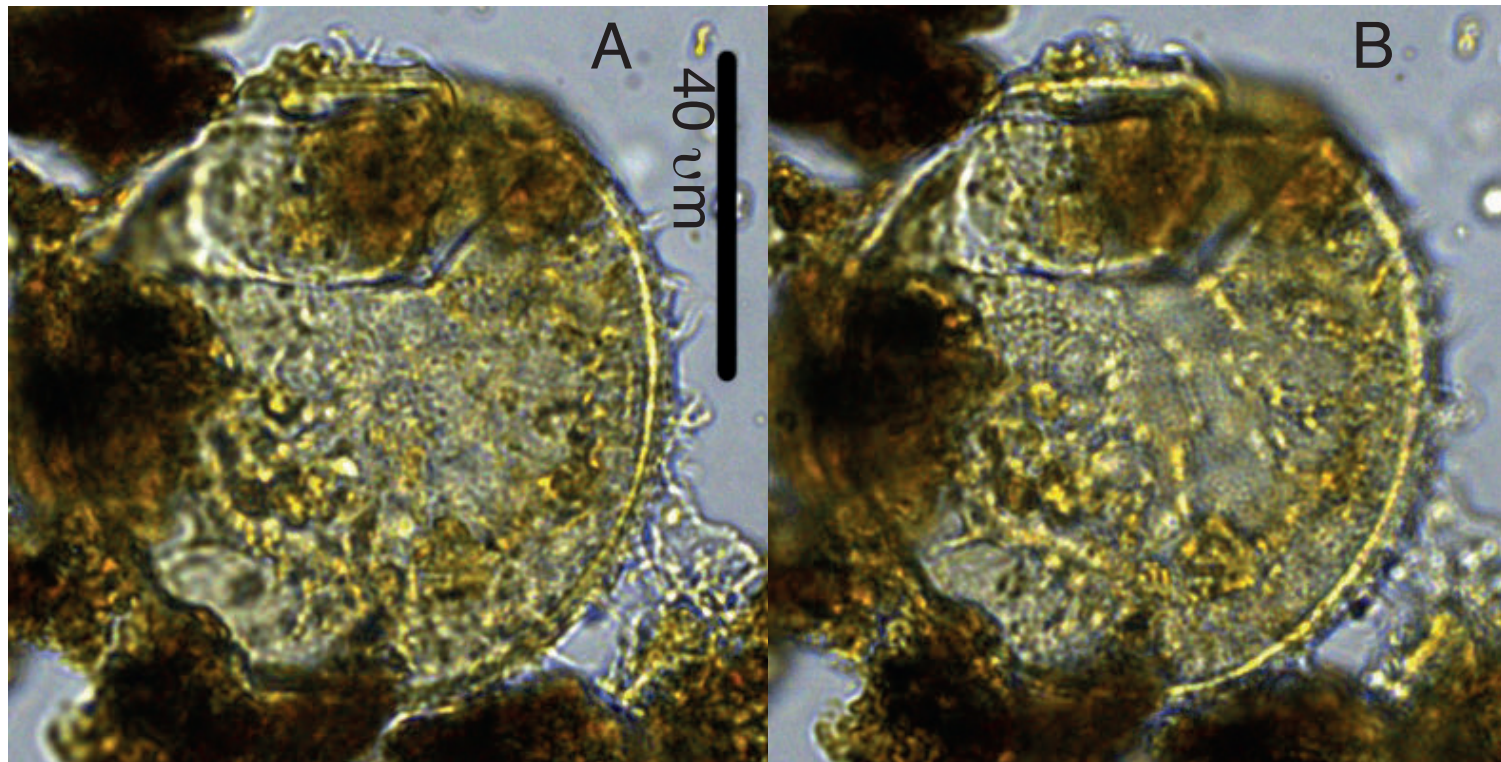


Plate S14. A-B: *Dracodinium pachydermum*, 27X-1-59/61cm, slide 1, O18. C-E: *Elytrocysta/Histiocysta?* spp., 27X-2-33/34cm, slide 2, R39-4. F-G: *Elytrocysta* spp., 27X-1-0/2cm, slide 1, H32. H: *Elytrocysta* spp., 27X-3-50/52cm, slide 1, Q31.

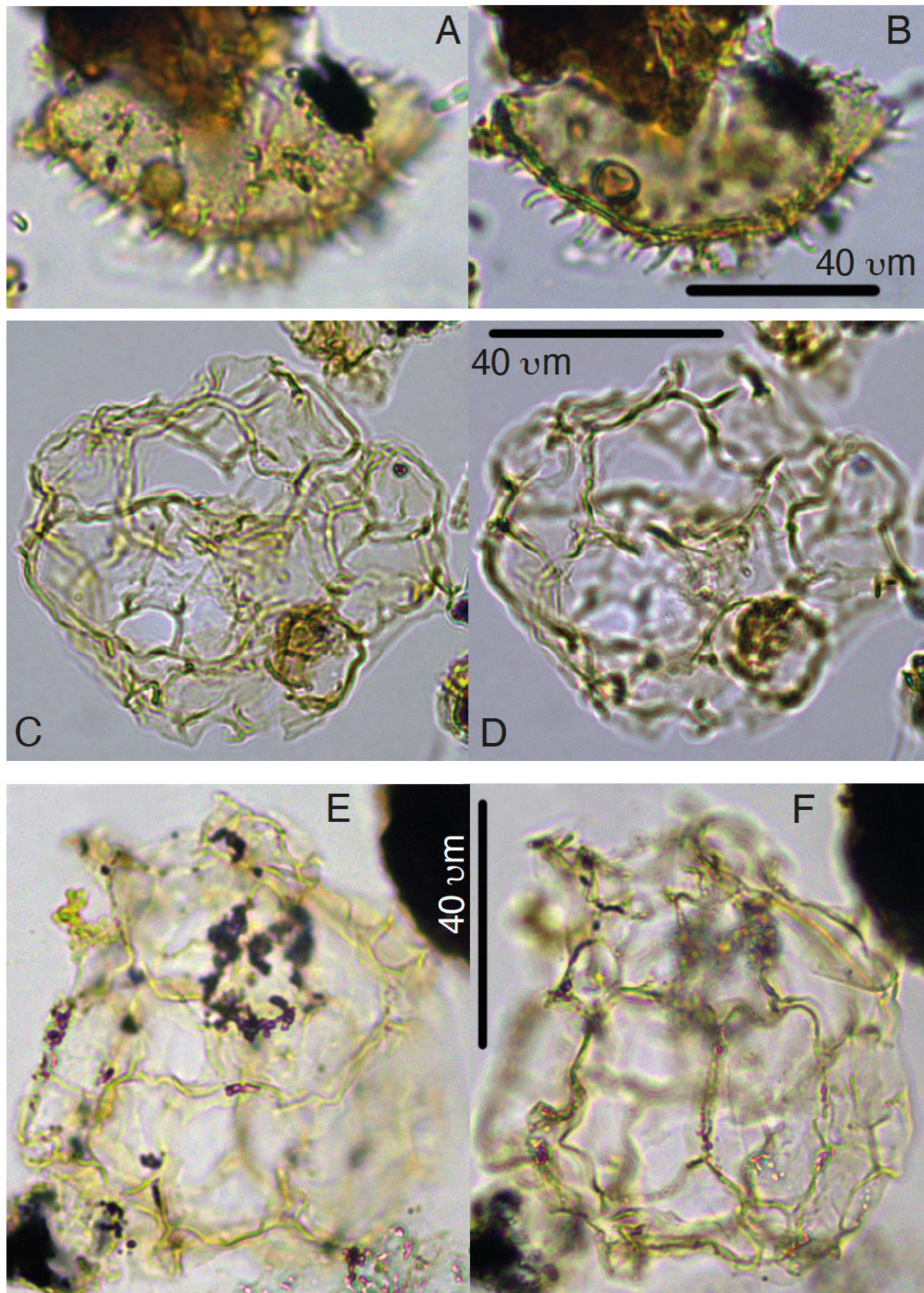


Plate S15. A-B: *Eocladopyxis peniculatum*, 27X-1-139/141cm, slide 1, O33-1. C-D: *Chaosphaerula sliwinskæ* Paratype, 27X-20/21cm, slide 1, F13-2), E: *C. sliwinskæ*, 27X-2-0/1cm, slide 1, O46-1.

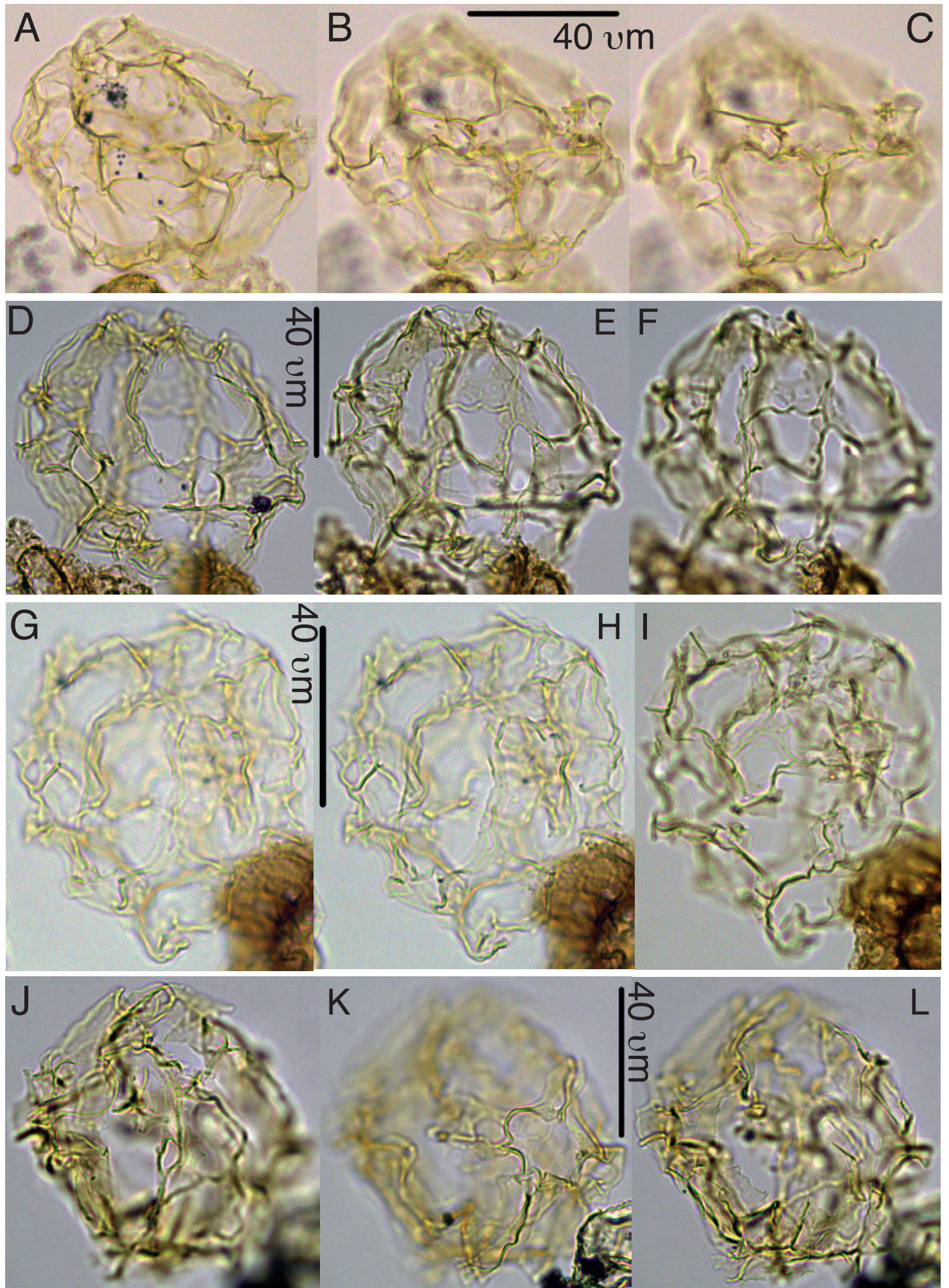


Plate S16. *Chaosphaerula sliwinskae*. A-C: Paratype, 27X-2-0/1cm, slide 1, Q40-3. D-F: Holotype, 27X-2 -00/02cm, slide 1, Q39-2. G-I: 27X-2-20/21cm, slide 1, S30-2. J-L: 27X-2-20/21cm, slide 1, N32.

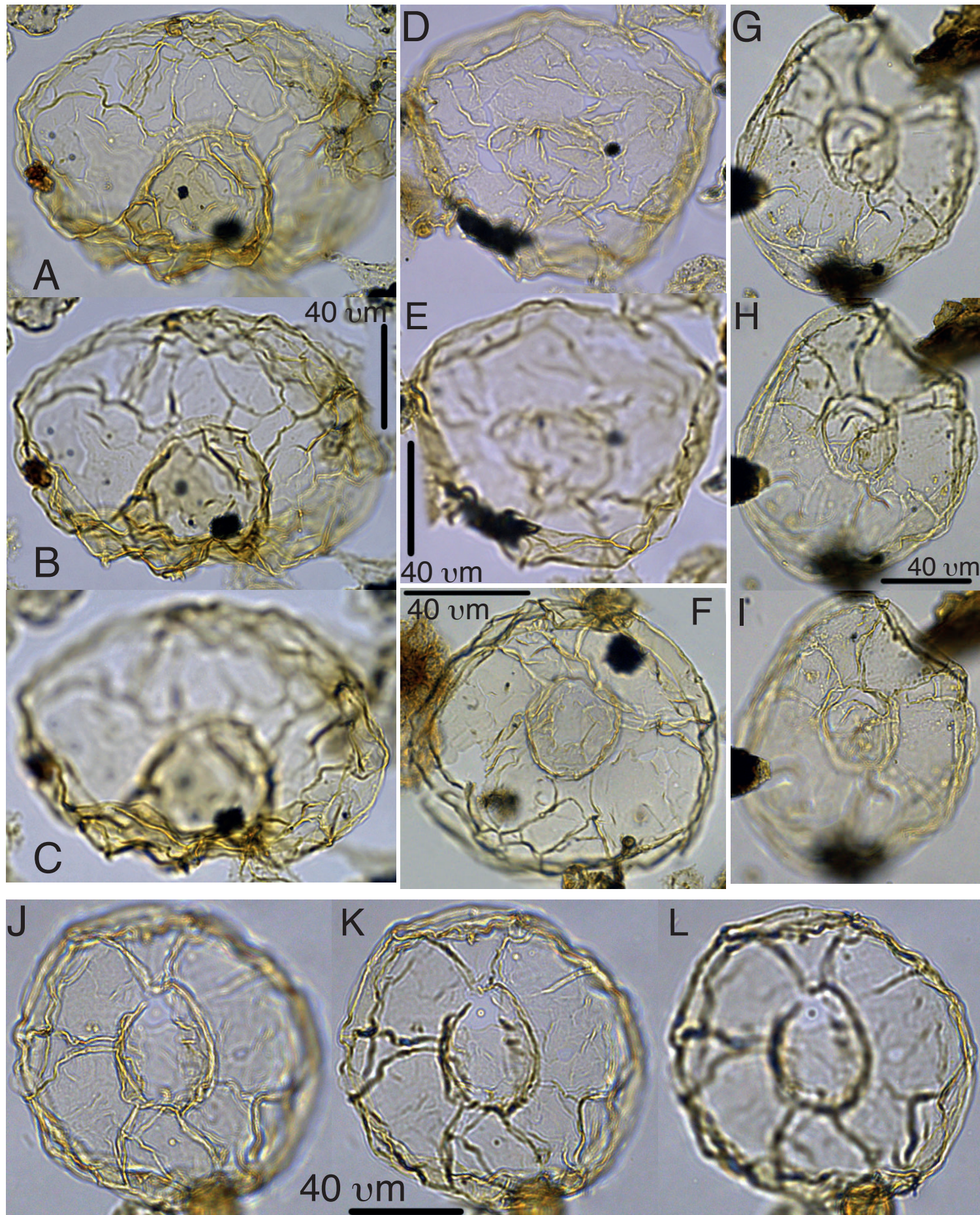


Plate S17. *Guersteinia delicata*. A-C: 27X-20/21cm, slide 1, J13-2. D-E: 27X-2-20/21cm, slide 1, H30-4. F: 27X-3-50/52cm, slide 1, X20-2. G-I: 27X-1-0/2cm, slide 1, J22. J-L: 27X-3-90/92cm, slide 2, G20-3.

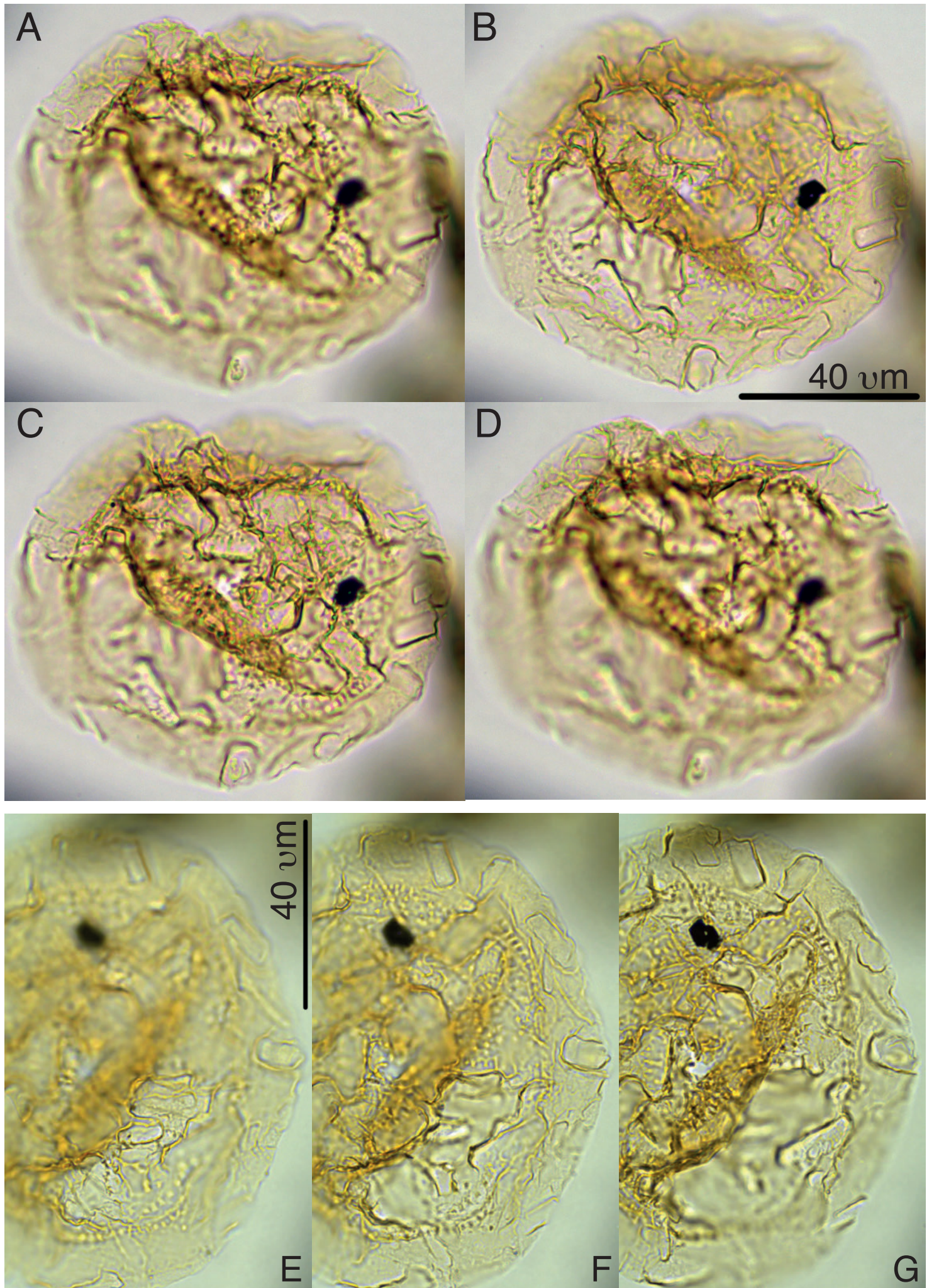
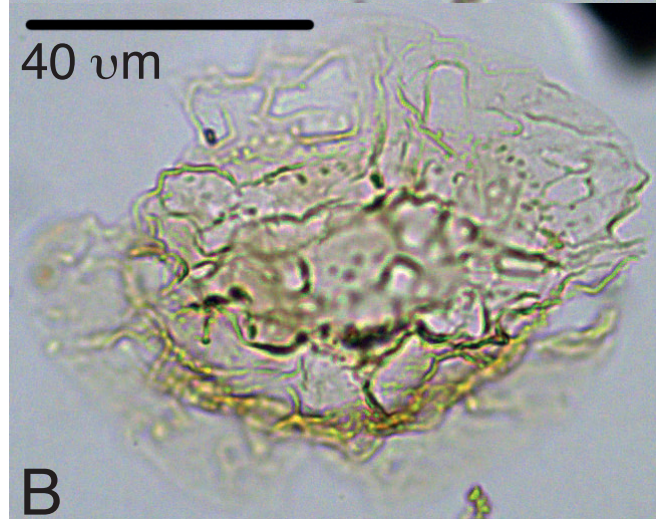


Plate S18. *Heteraulacacysta pramparoe*. A-H: Holotype, X27-3-90/92cm, slide 1, K22.

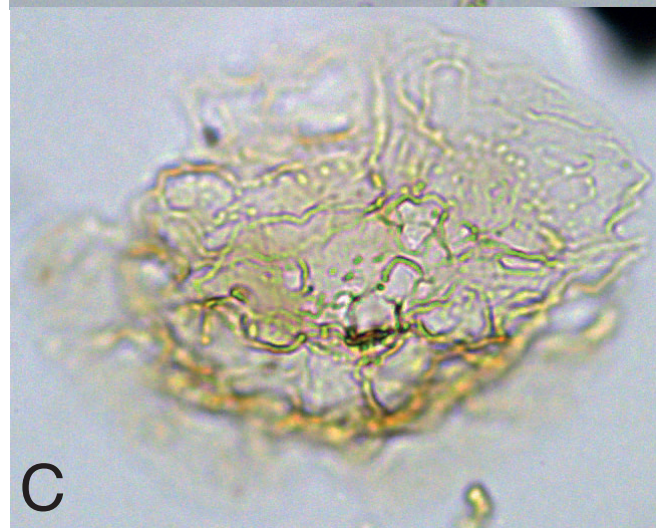


A

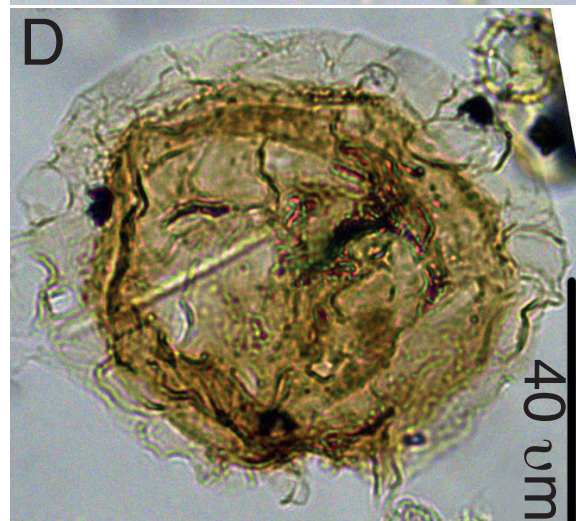
40 μ m



B

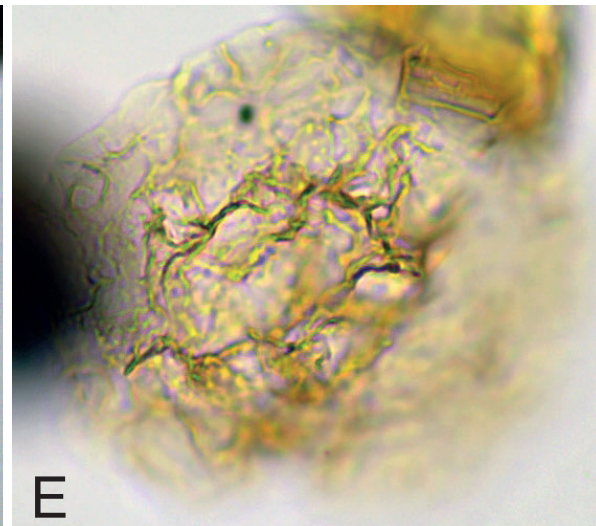


C

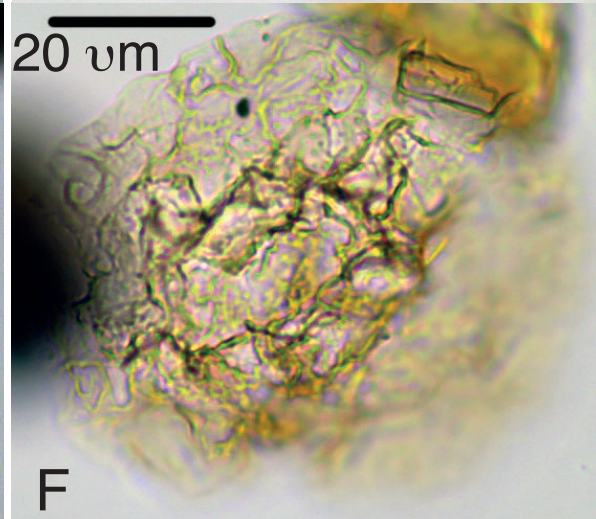


D

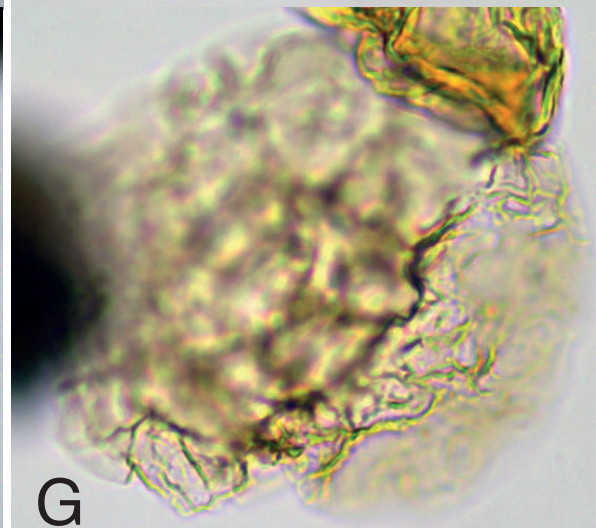
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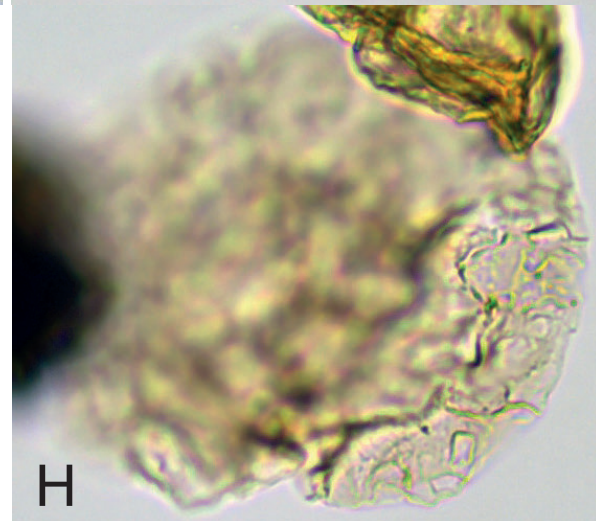
E



F



G



H

Plate S19.
Heteraulacacysta
pramparoe.
A-C: Paratype,
sample 27X-3-
110/112cm, slide
1, H18-4).
D: sample
27X-2-20/21cm,
slide 1, B12-4.
E-H: Paratype,
sample
X27-3-90/92cm,
slide 1, D17-3.

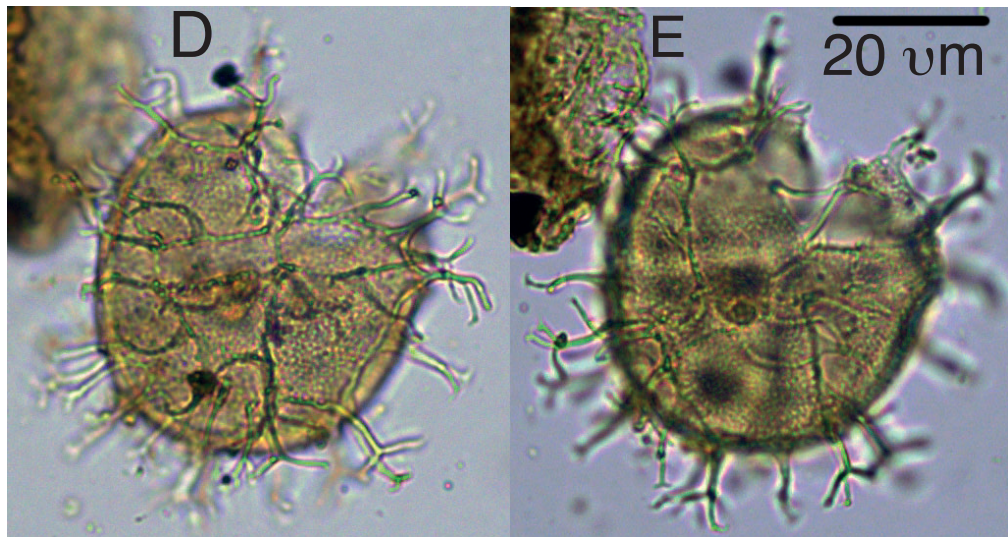
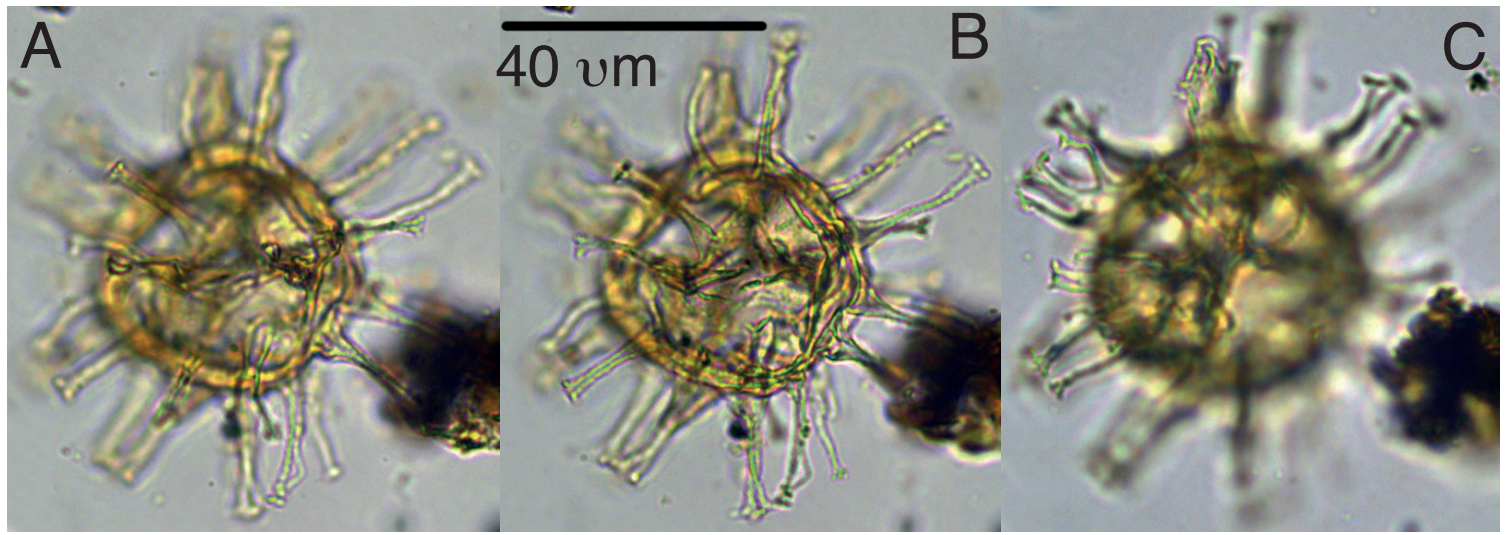
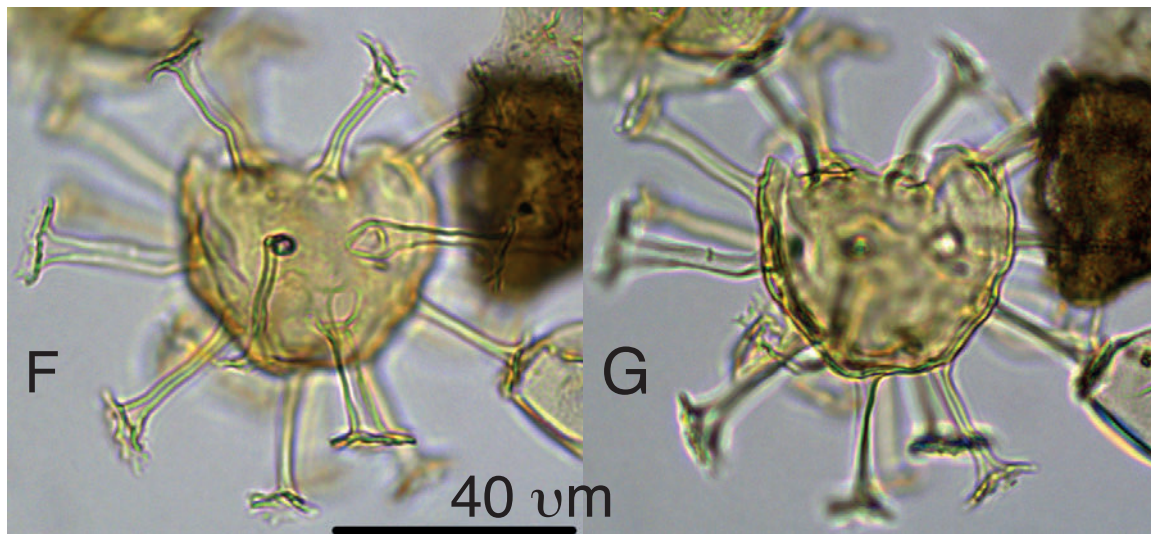


Plate S20.
 A-C: *Florentinia* sp.,
 30X-1-141/143cm, slide 1,
 L35-3.
 D-E: *Hafniasphaera* cf. *septata*,
 27X-CC, slide 1, P28-4.
 F-G: *Hystrichosphaeridium*
tubiferum, 27X-2-20/22cm, slide
 1, P24-1. H-J *Hystrichosphaeri-*
dium tubiferum, 27X-2-33/34cm,
 slide 1, S46-2.



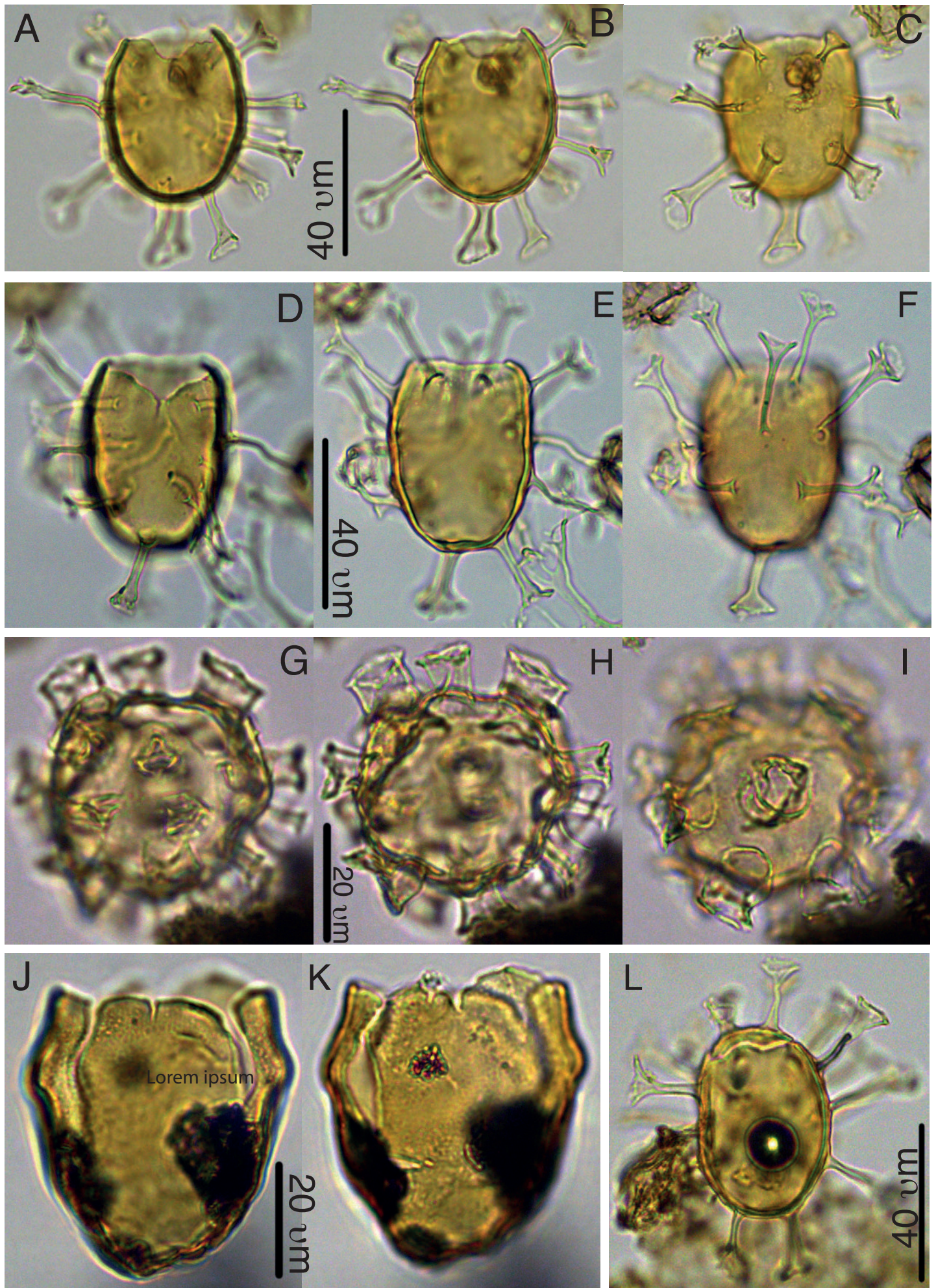


Plate S21. Variations of *Hystrichosphaeridium tubiferum*. A-C: elongate type, 27X-2-33/34cm slide 1, X31-1. D-F: idem, 27X-2-33/34cm, slide 1, R37-1. G-I: H. short processes, 27X-3-50/52cm, slide 1, Q32-3. J-K: no processes, 27X-2-20/21cm, slide 1, C44-1. L: elongate, 27X-2-33/34cm, slide 1, W46-3.

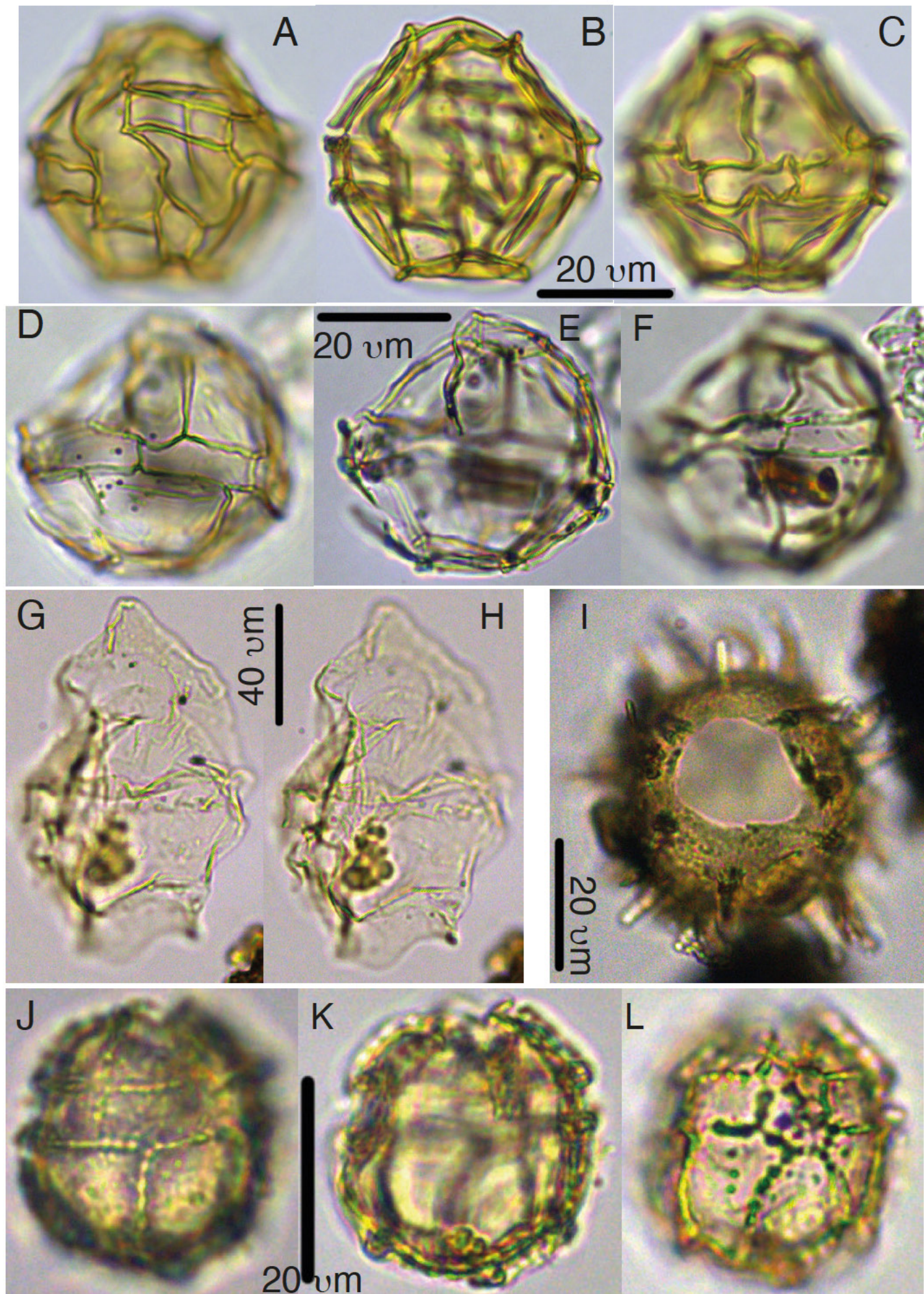


Plate S22. A-C: *Impagidinium dispertitum*, 33X-CC, slide 1, D30-3. D-F: *I. dispertitum*, 30X-1-101/103 cm, slide 1, P21. G-H: *Isabelidinium viborgense*, 27X-1-10/12cm, slide 1, O21. I: *Operculodinium* spp., 27X-1-0/2cm, slide 1, L21-3. J-L: *Microdinium ornatum*, 27X-1-10/12cm, slide 1, U31-1.

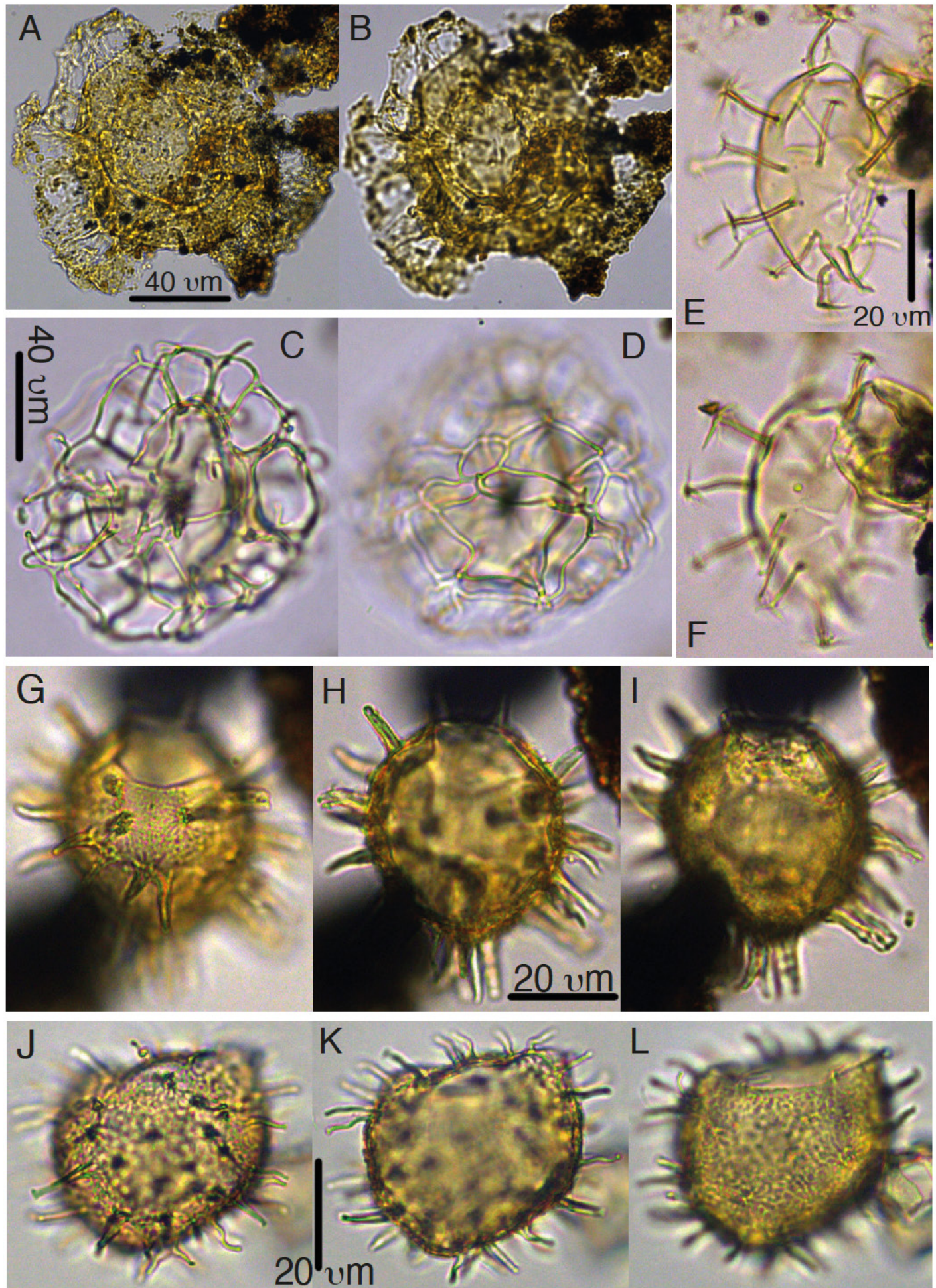


Plate S23. A-B: *Muratodinium fimbriatum*, 27X-3-101/103cm, slide 1, J42-3. C-D: *Nemosphaeropsis* sp., 27X-3-50/52cm, slide 1, J34-3. E-F: *Melitasphaeridium pseudorecurvatum*, 27X-2-0/1cm, slide 2, N32. G-J: *Operculodinium* spp., 27X-1-0/2cm, slide 1, J29. J-L: *Operculodinium* spp., 27X-3-40/42cm, slide 1, L23-3.

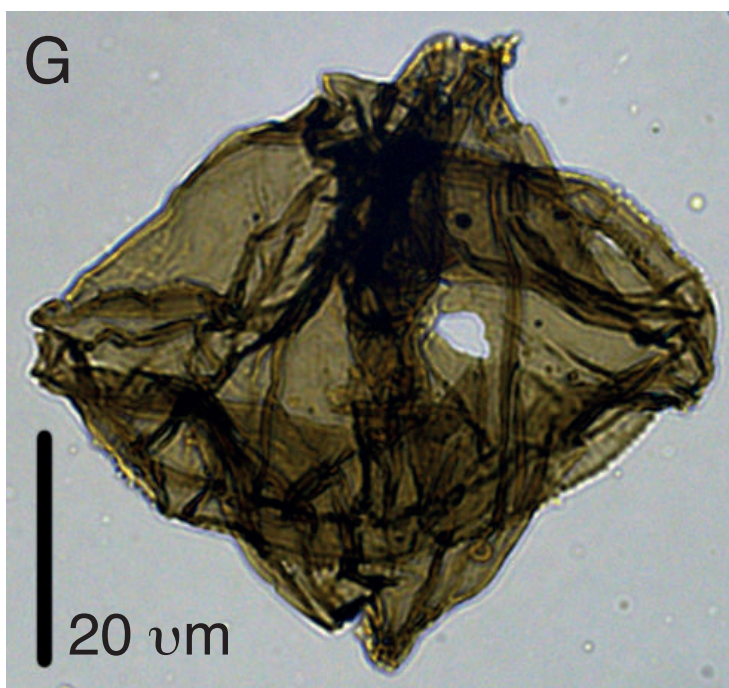
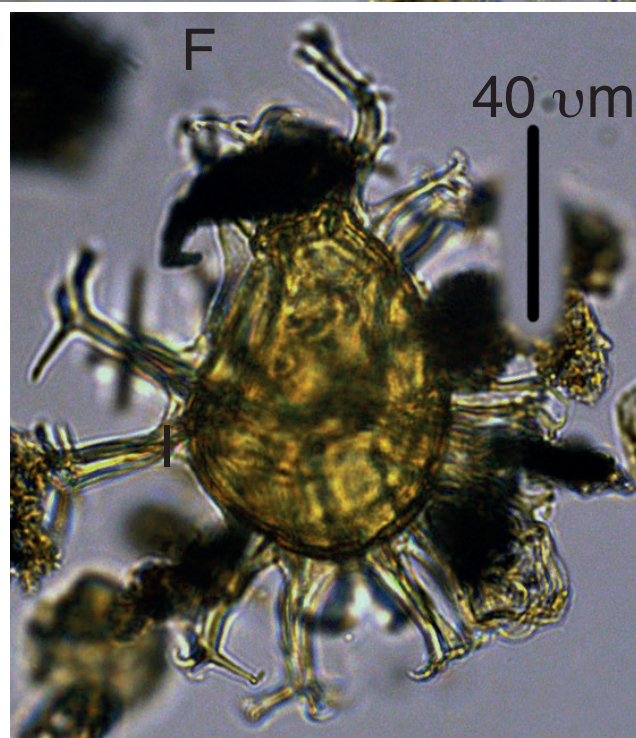
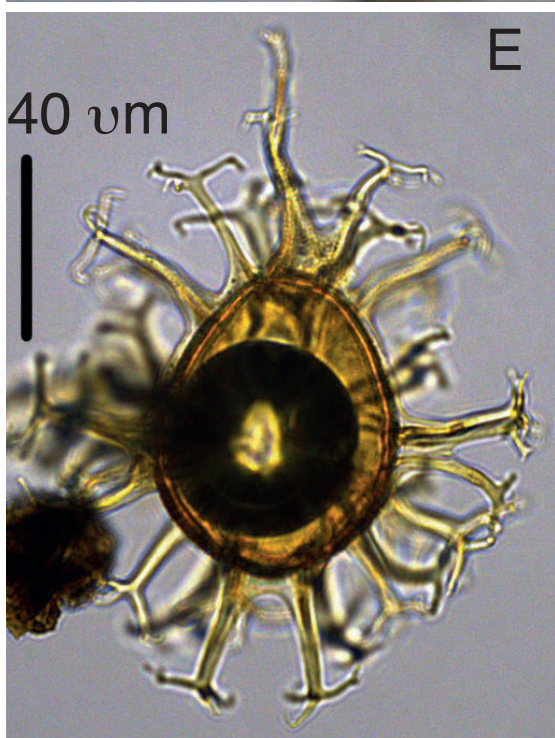
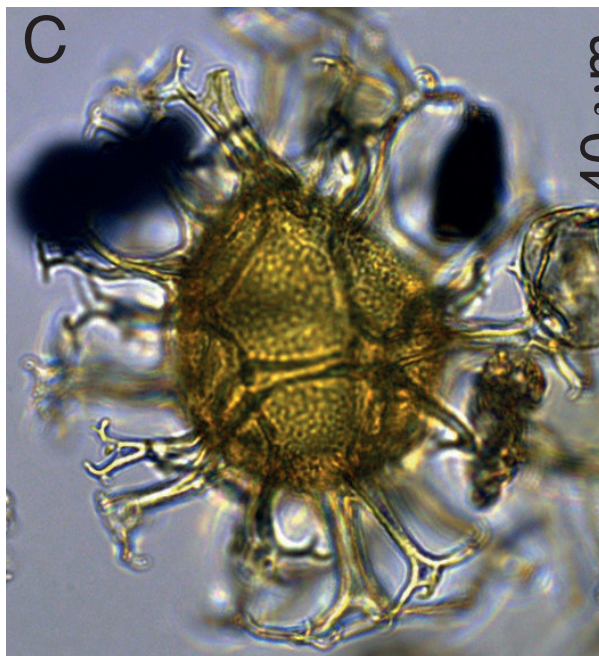
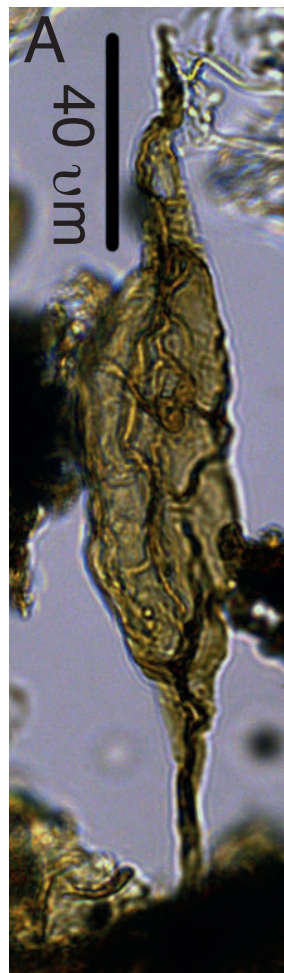


Plate S24.

A: *Paleocystodinium* spp., 27X-3-30/32cm, slide 1, M22).

B: *Paleocystodinium* spp., 27X-2-0/1cm, slide 1, N30.

C-F: *Spiniferella crouchiae* C-D: Holotype, 27X-3-50/52, slide 1, N26-4. E: Paratype, 27X-2-20/21cm, slide 1, C19-1. F: Paratype 27X-3-30/32, slide 1, K27.

G: *Phelodinium magnificum*, 27X-3-101/103cm, slide 1, N37.

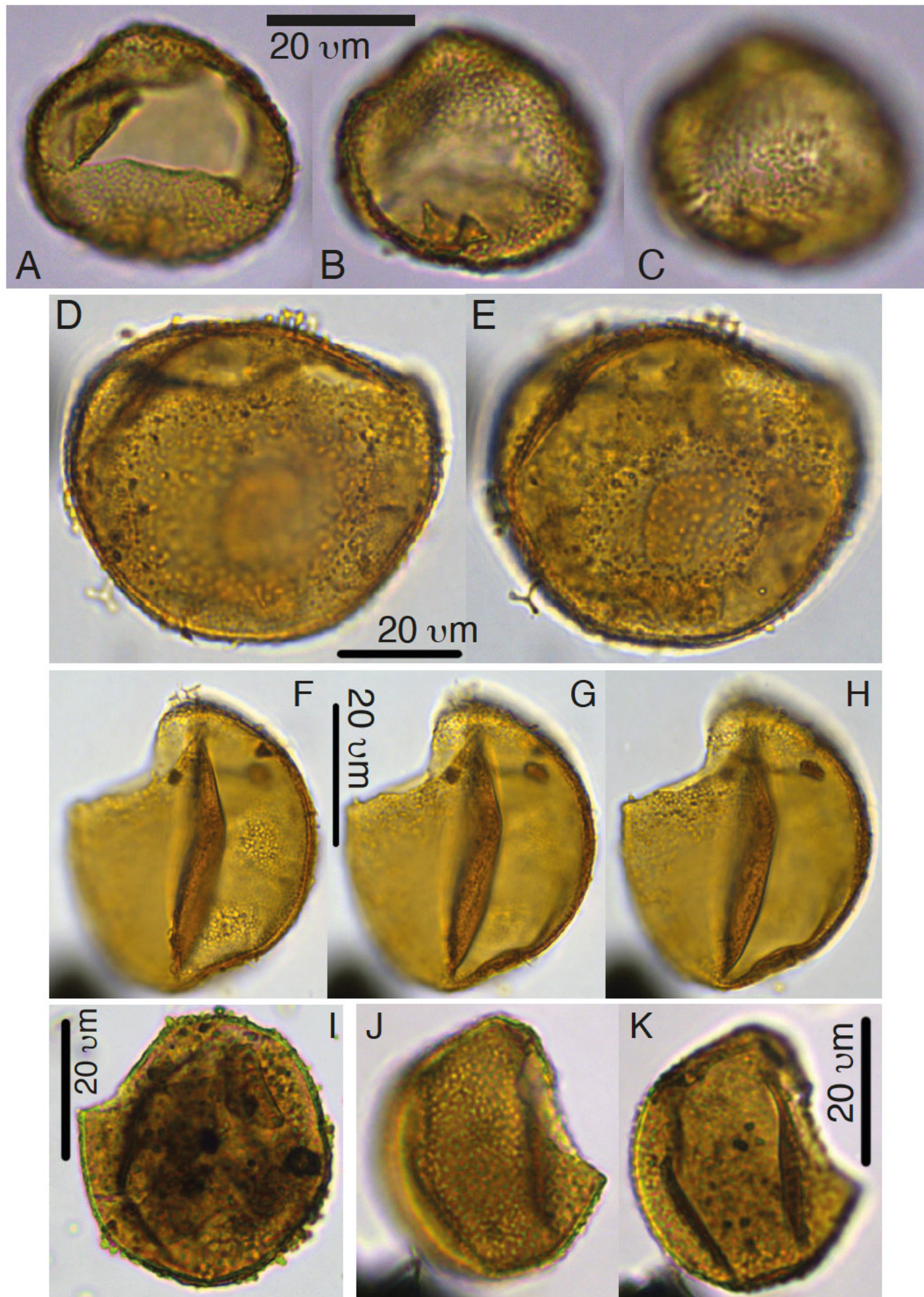


Plate S25. *Pyxidínopsis iakovlevae*. A-C: Holotype, 27X-3-20/22cm, slide 1, W14-4. D-E: Paratype, 27X-1-10/12cm, slide 2, H27-4. F-G: Paratype, 27X-3-50/52cm, slide 2, M20-1. I: 32X-2-81/83cm, slide 1, L-41. J-K: 32X-CC, F29-3.

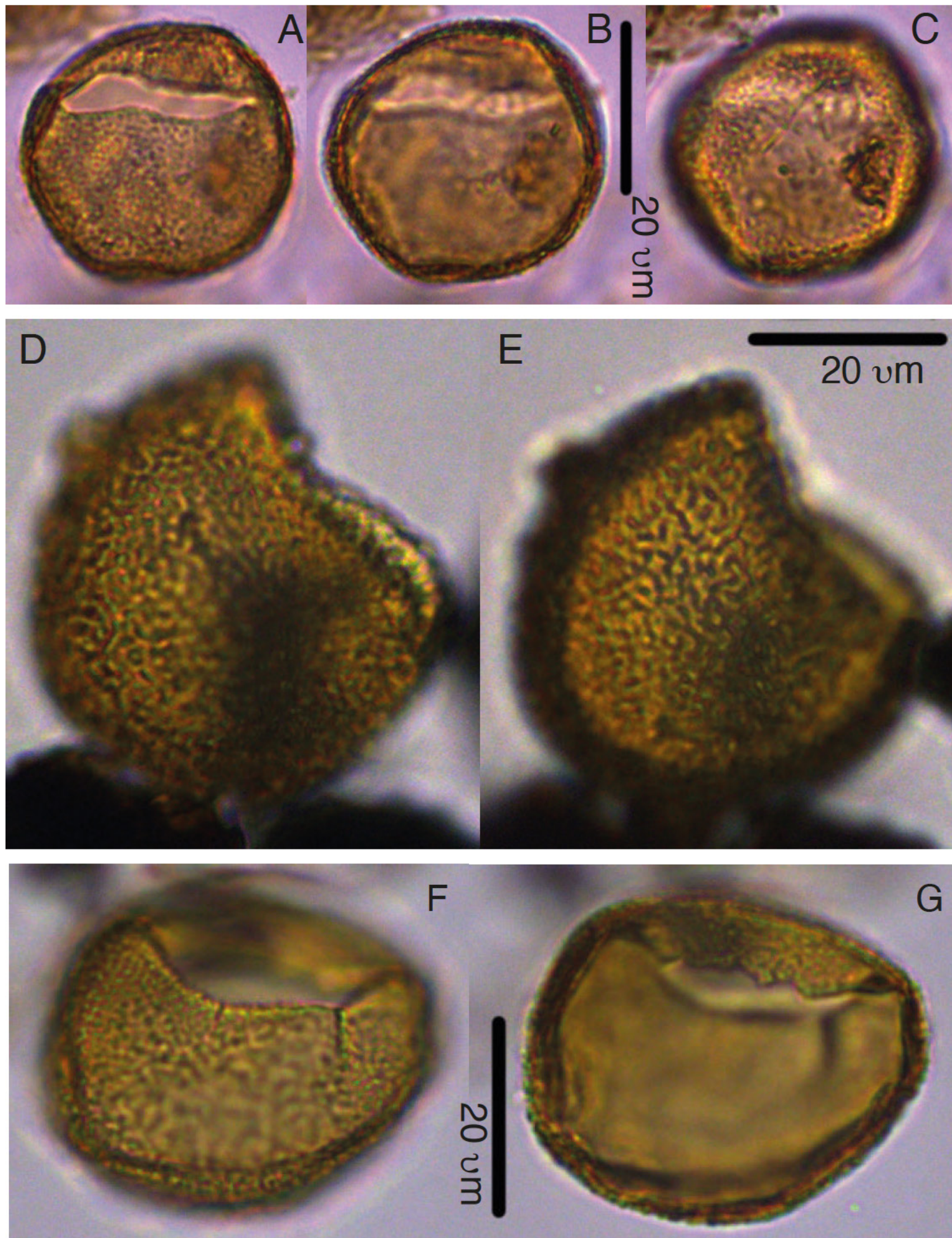


Plate S26. *Pyxidinospis iakovlevae*. A-C: Paratype, 27X-1-10/12cm, slide 2, W30-1. D-E: Paratype, 33X-CC, slide 1, K13-1. F-G: Paratype, 33X-CC, slide 1, V22-4.

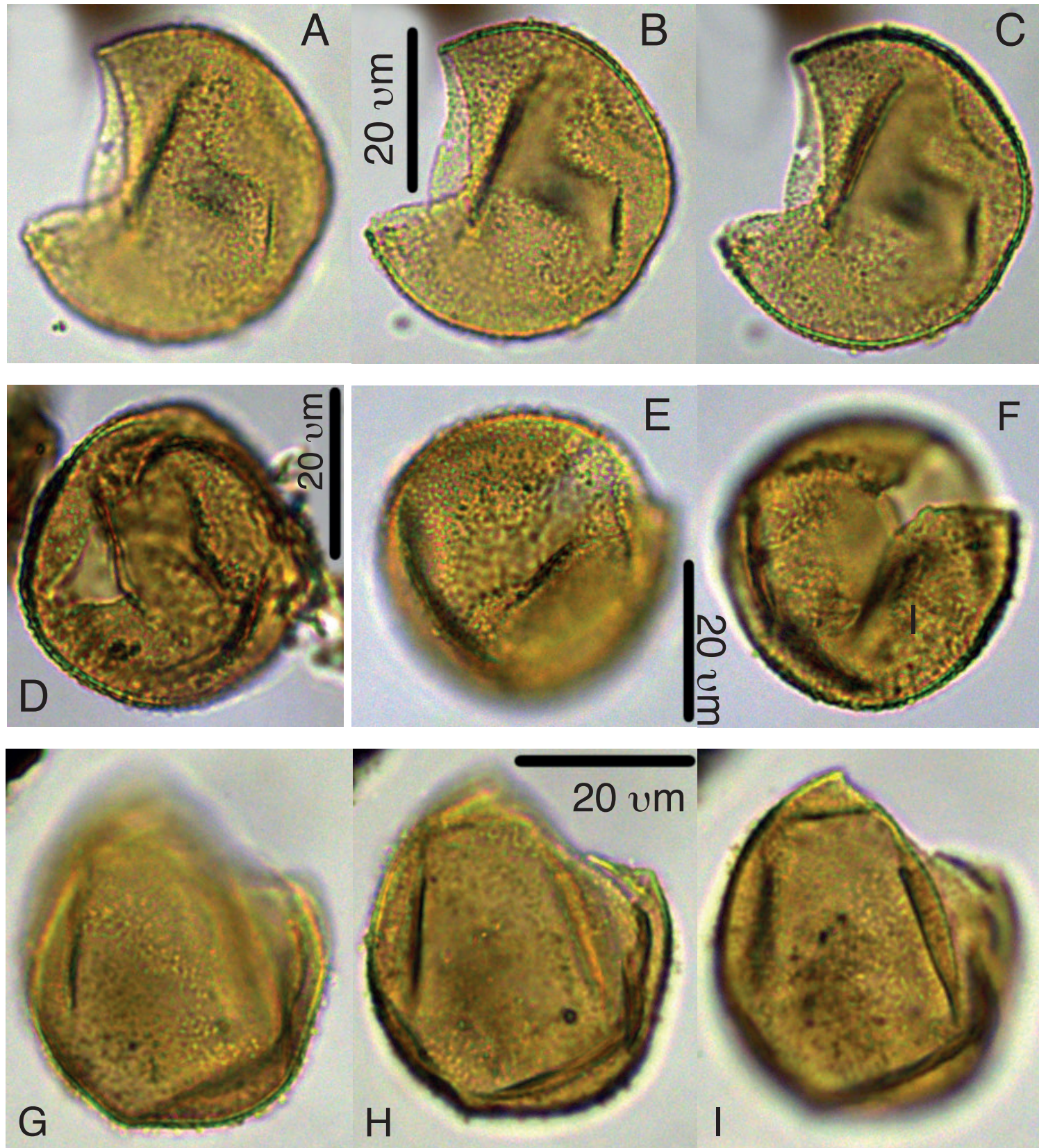


Plate S27. *Pyxidinosia iakovlevae*. A-C: 27X-3-60/62cm, slide 1, S19, D: 27X-3-60/62cm, slide 1, R19-3, E-F: 27X-3-60/62cm, slide 1, R19-4, G-I: 27X-3-110/112cm, slide 1, P31-3.

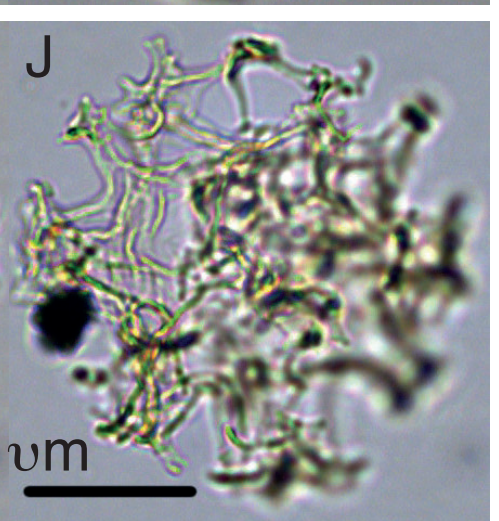
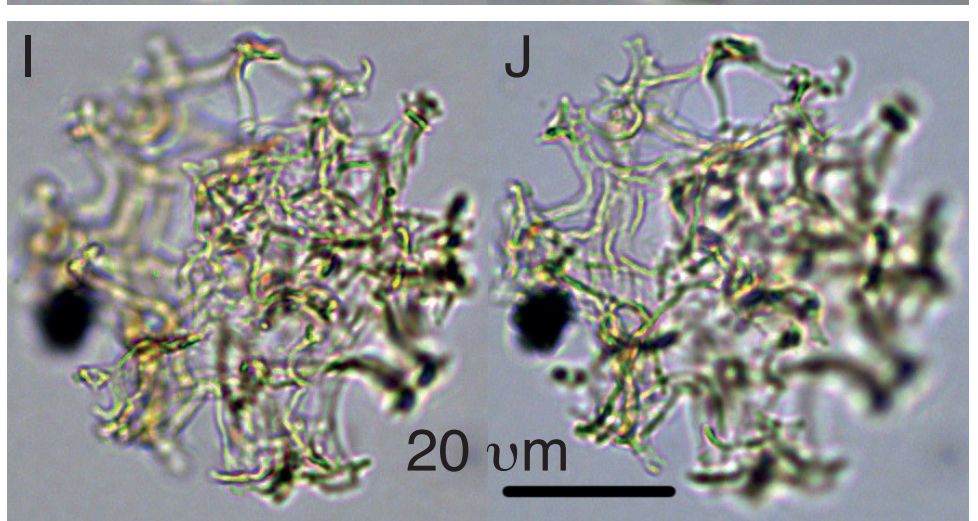
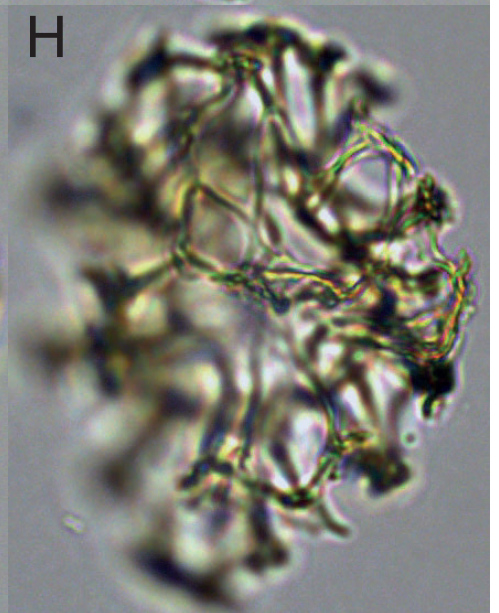
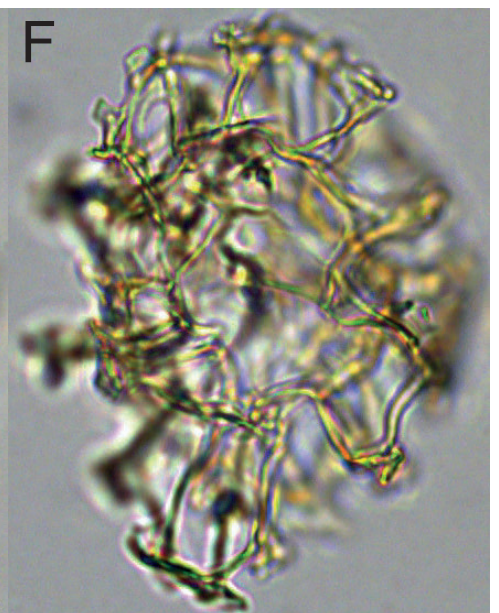
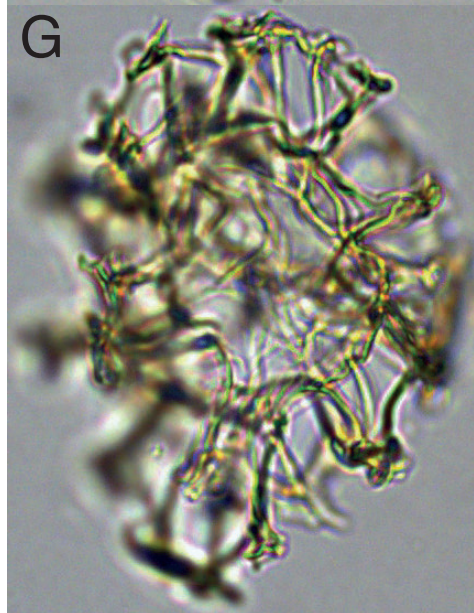
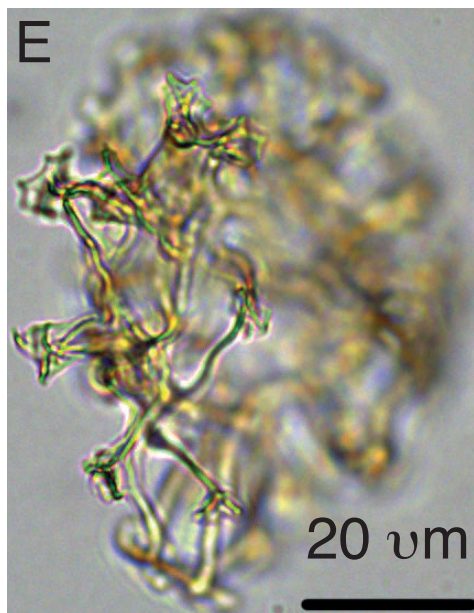
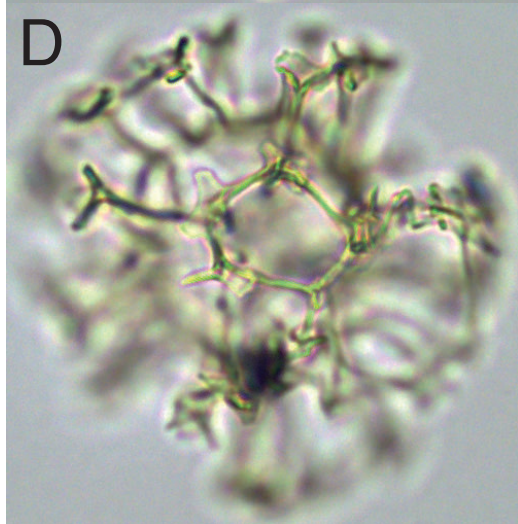
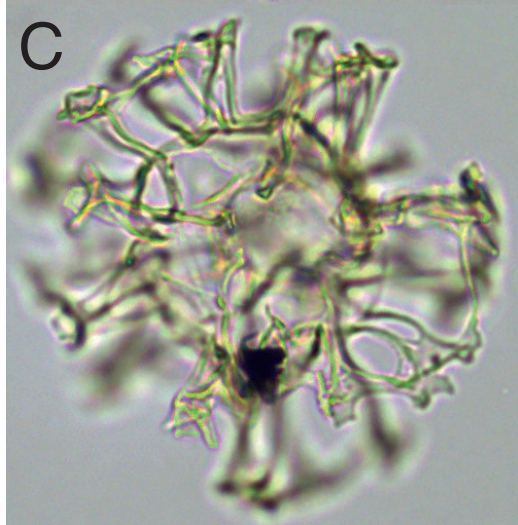
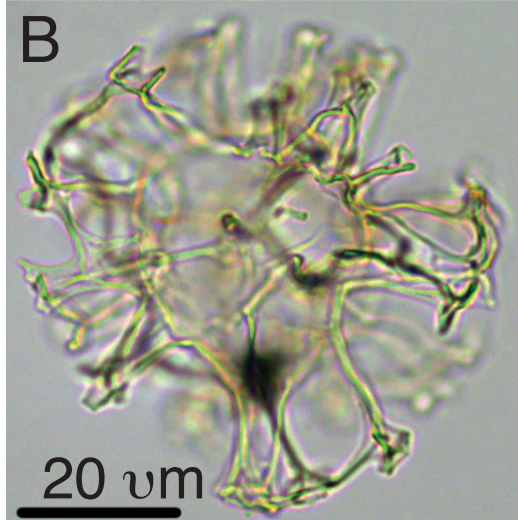
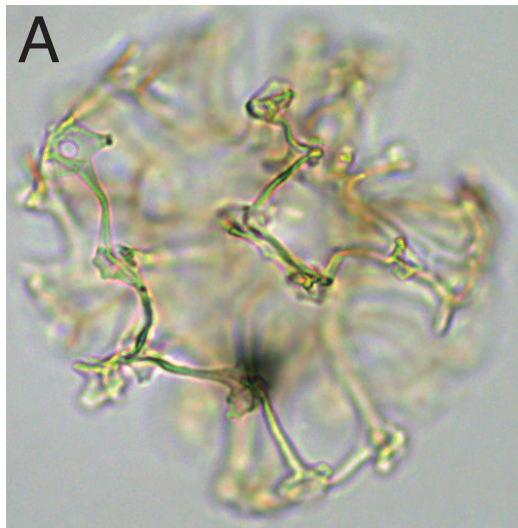


Plate S28. *Sangiorgia marretiae*. A-D: Holotype, 27X-3-80/82cm, slide 1, S25-2, E-H: 27X-3-80/82cm, slide 1, H21-2, I-J: 27X-3-80/82cm, slide 1, H22.

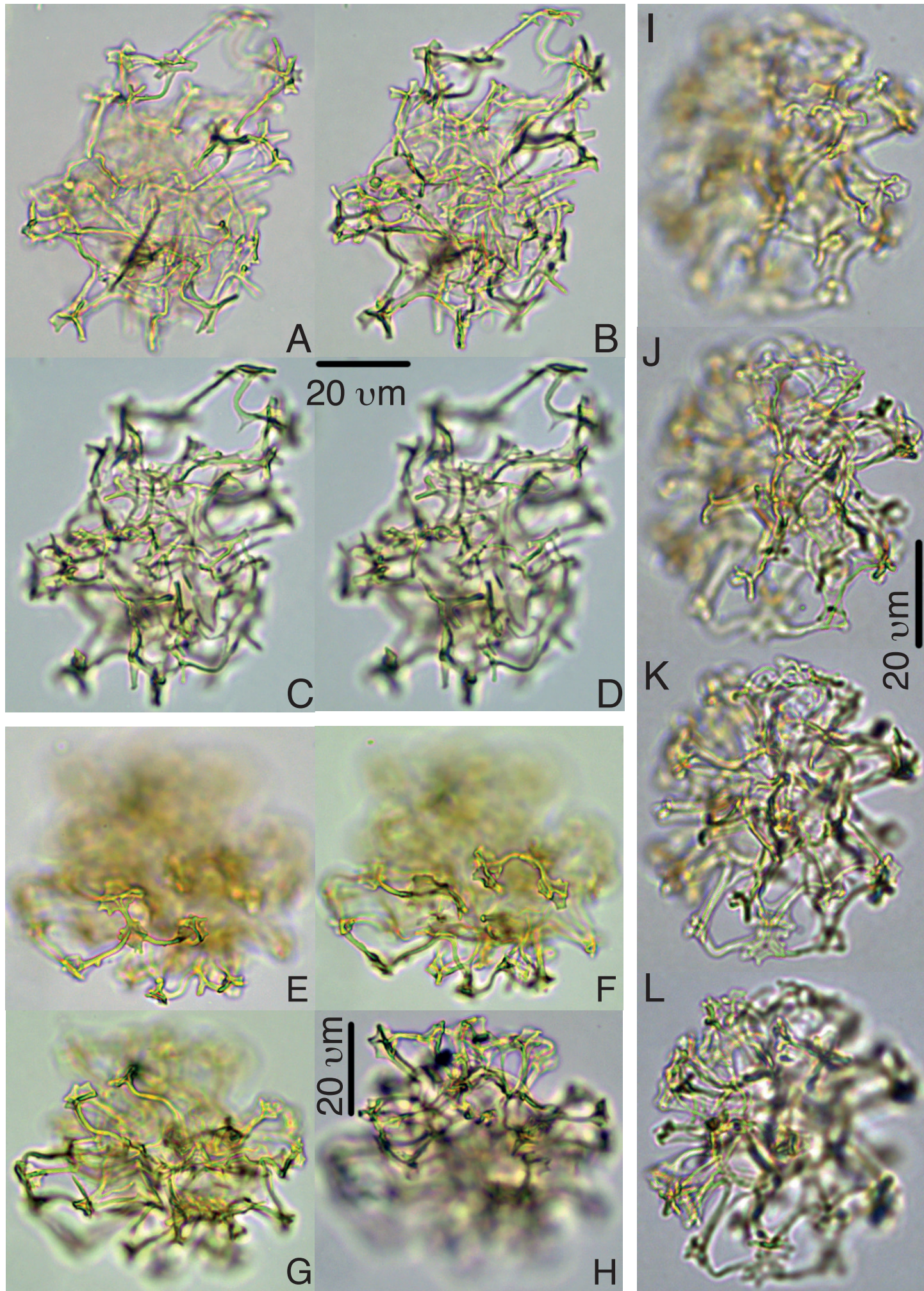


Plate S29. *Sangiorgia marretiae*. A-D: Paratype, 27X-3-80/82cm, slide 1, G27-4, E-H: 27X-380/82cm, slide 1, G28-4, I-L: Paratype, 27X-3-80/82cm, slide 1, O31.

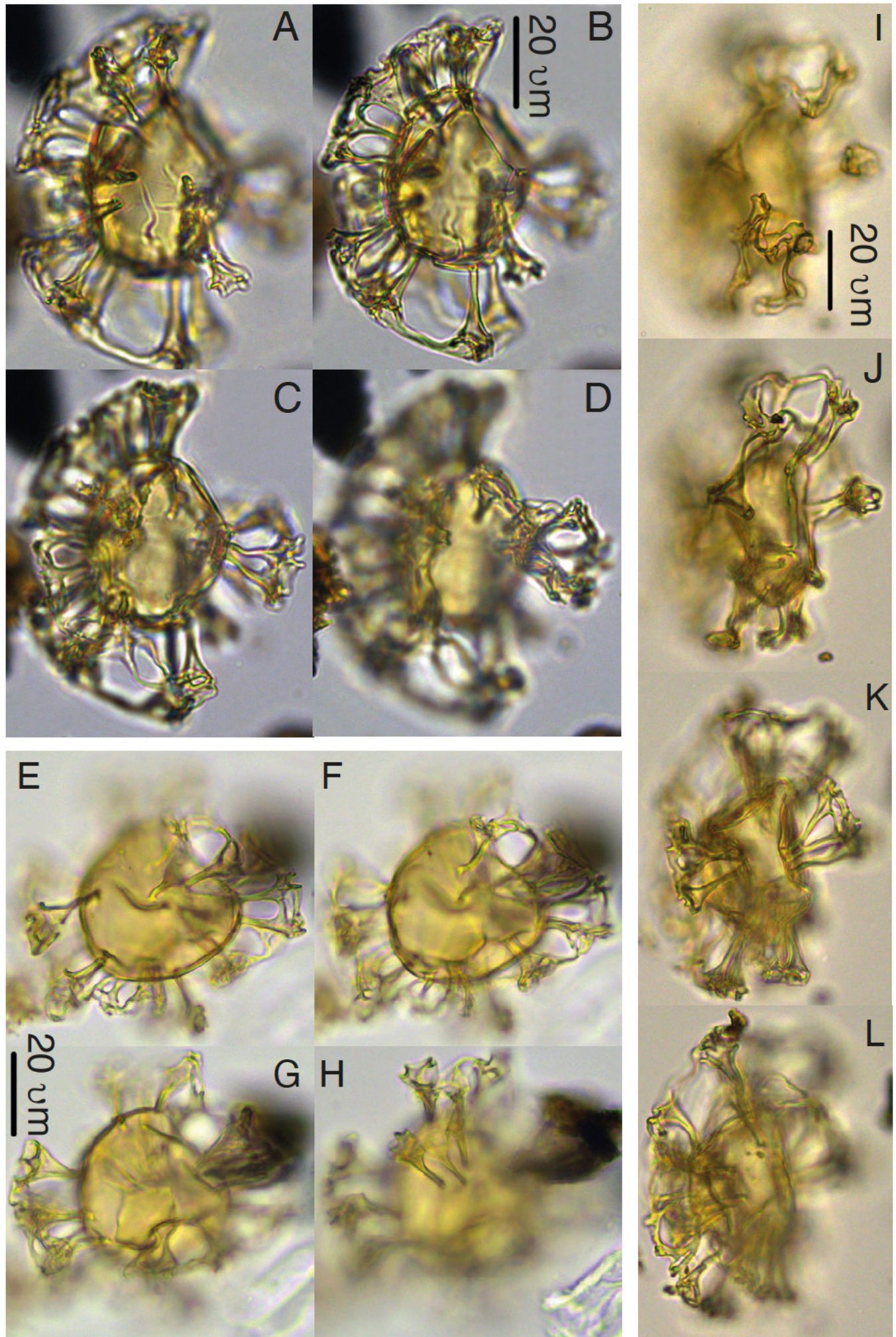


Plate S30. *Sangiorgia pospelovae* A-D: Holotype, 28X-2-130/132cm, slide 1, J27-2. E-H: Paratype, 28X-40/42, slide 1, U20-4. I-L: Paratype, 27X-4-10/12cm, slide 1, L27-4.

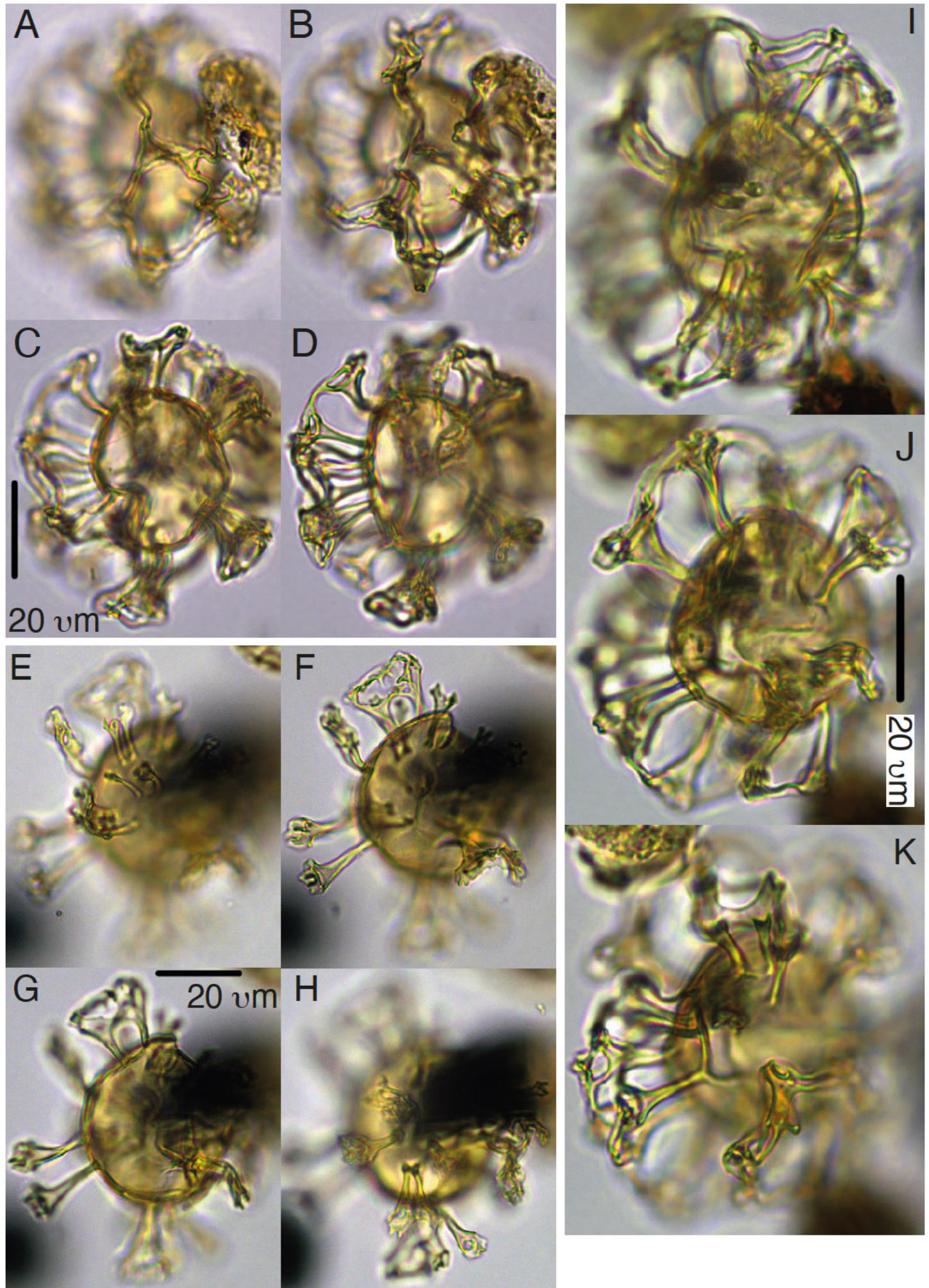


Plate S31. *Sangiorgia pospelovae*. A-D: 28X-2-40/42cm, slide 1, F23, E-H: 28X-2-130/132cm, S29-3, I-K: 28X-2-40/42cm, slide 1, G28-4.

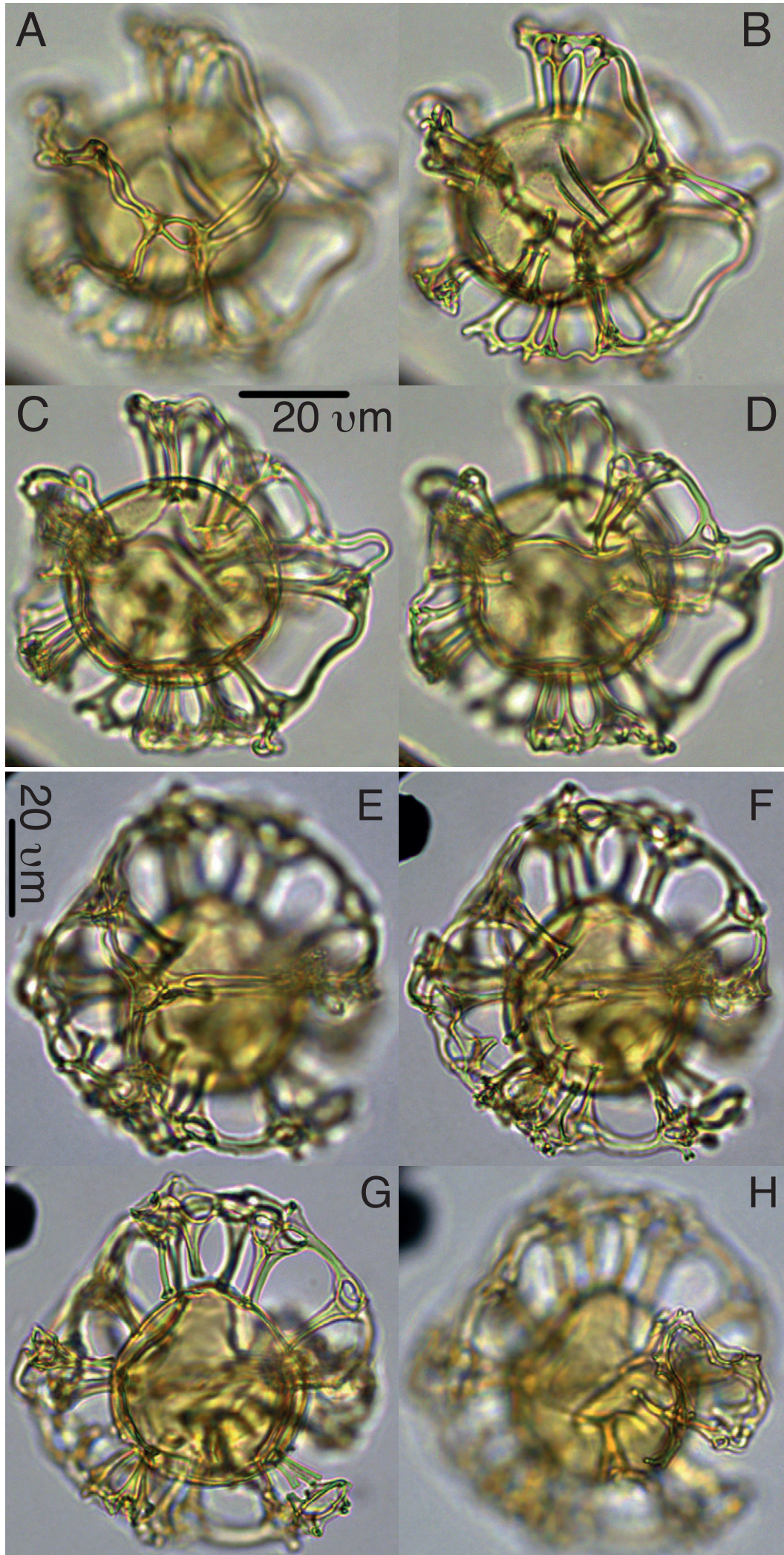


Plate S32.
Sangiorgia pospelovae.
 A-D: sample 27X-3-60/62cm,
 slide 1, L25.
 E-H: Paratype, sample
 27X-3-80/82cm, L17-4.

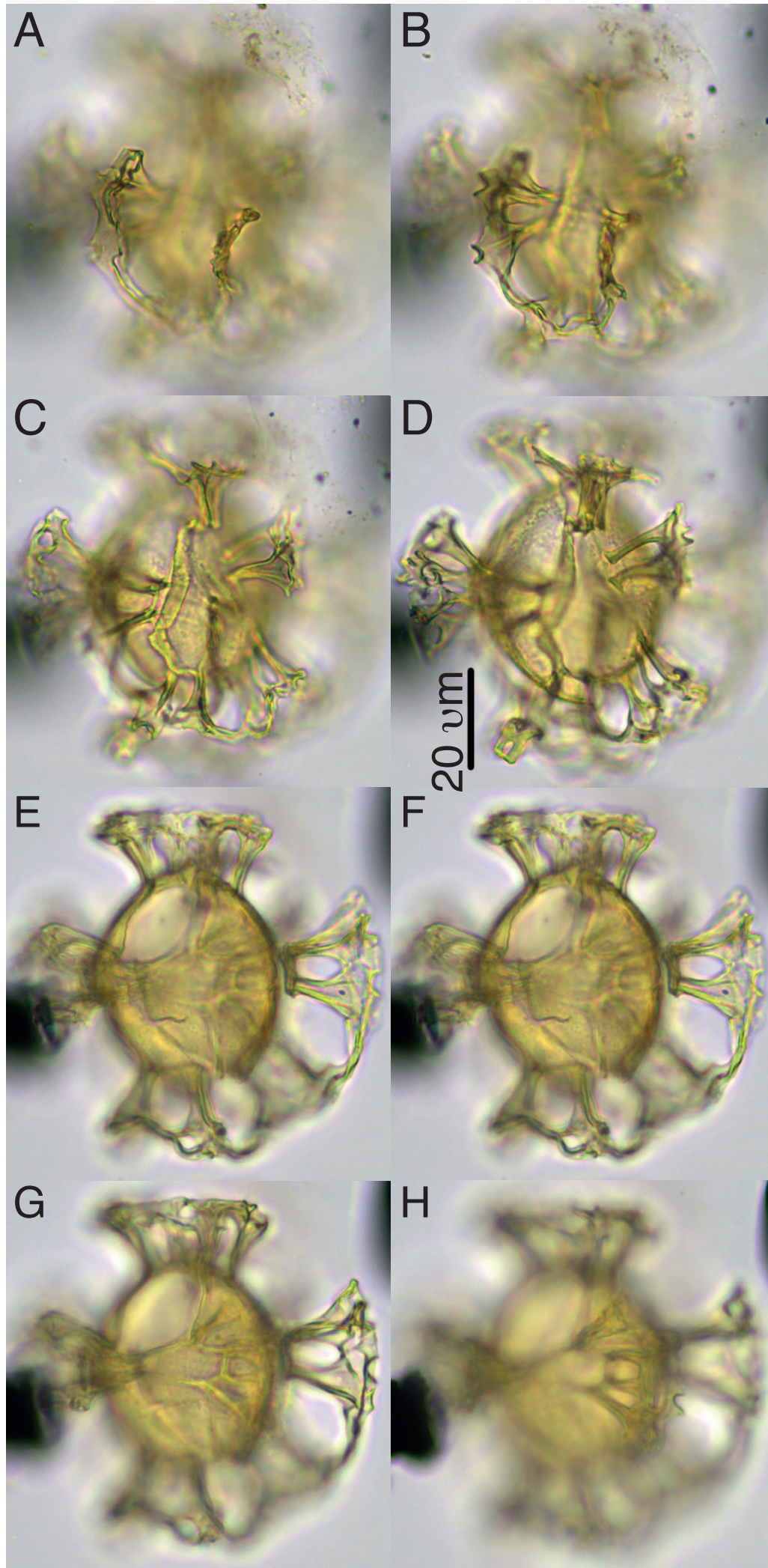


Plate S33.
Sangiorgia pospelovae.
A-H: 27X-4-16/18cm, slide 1,
O33-3.

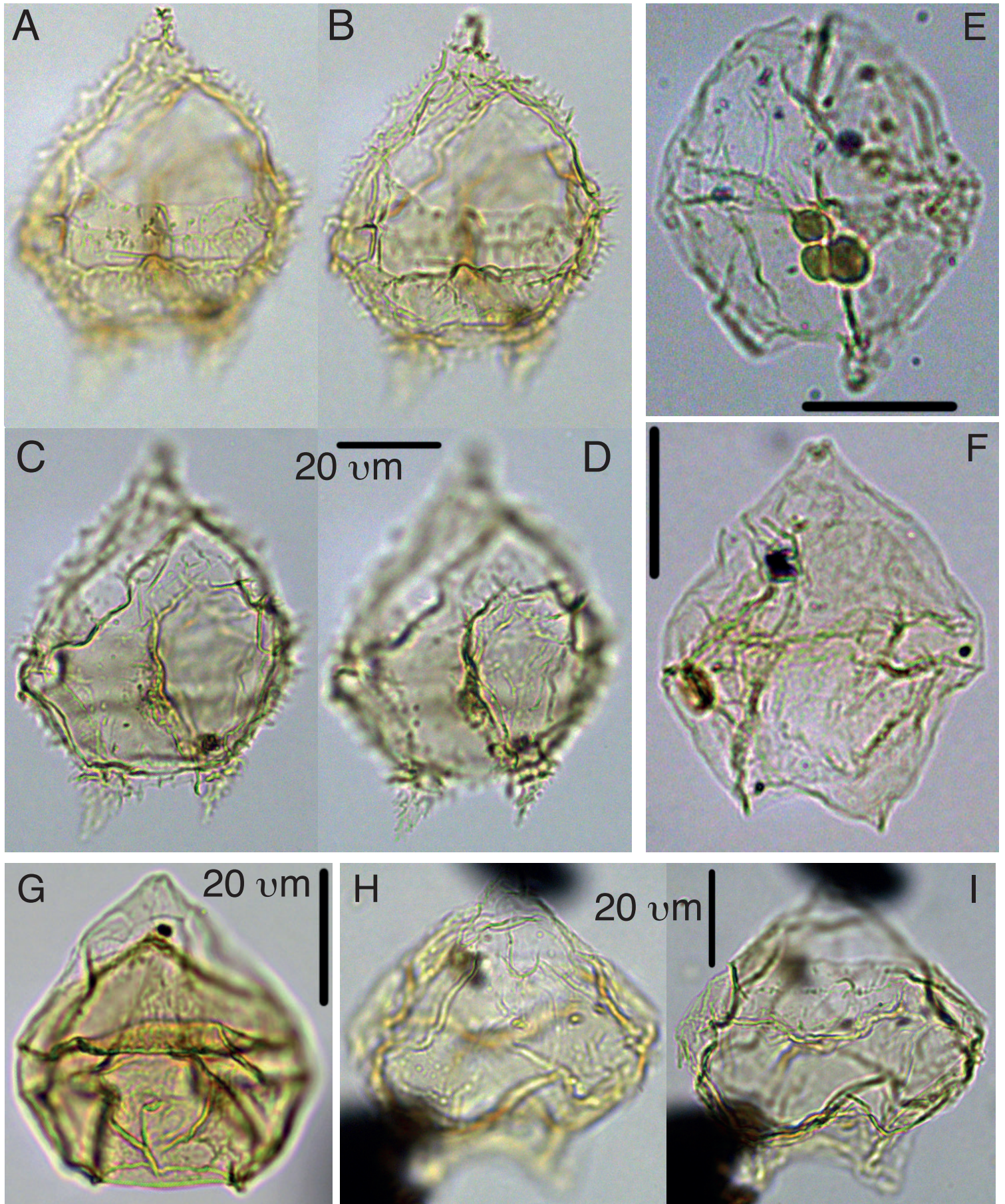


Plate S34. Representatives of the *Senegalinium* cpx. A-D: *Lentinia wetzelii*, 27X-3-60/62cm, slide 1, H20-3. E: *Senegalinium* sp., 27X-3-101/103cm, K37-4. F: *Senegalinium* sp., 27X-2-20/21cm, slide 1, B33. G: *Senegalinium dilwynense*, 28X-2-10/12cm, slide 1, L26. G-H: *Senegalinium dilwynense*, 28X-2-130/132cm, slide 1, D31-1.

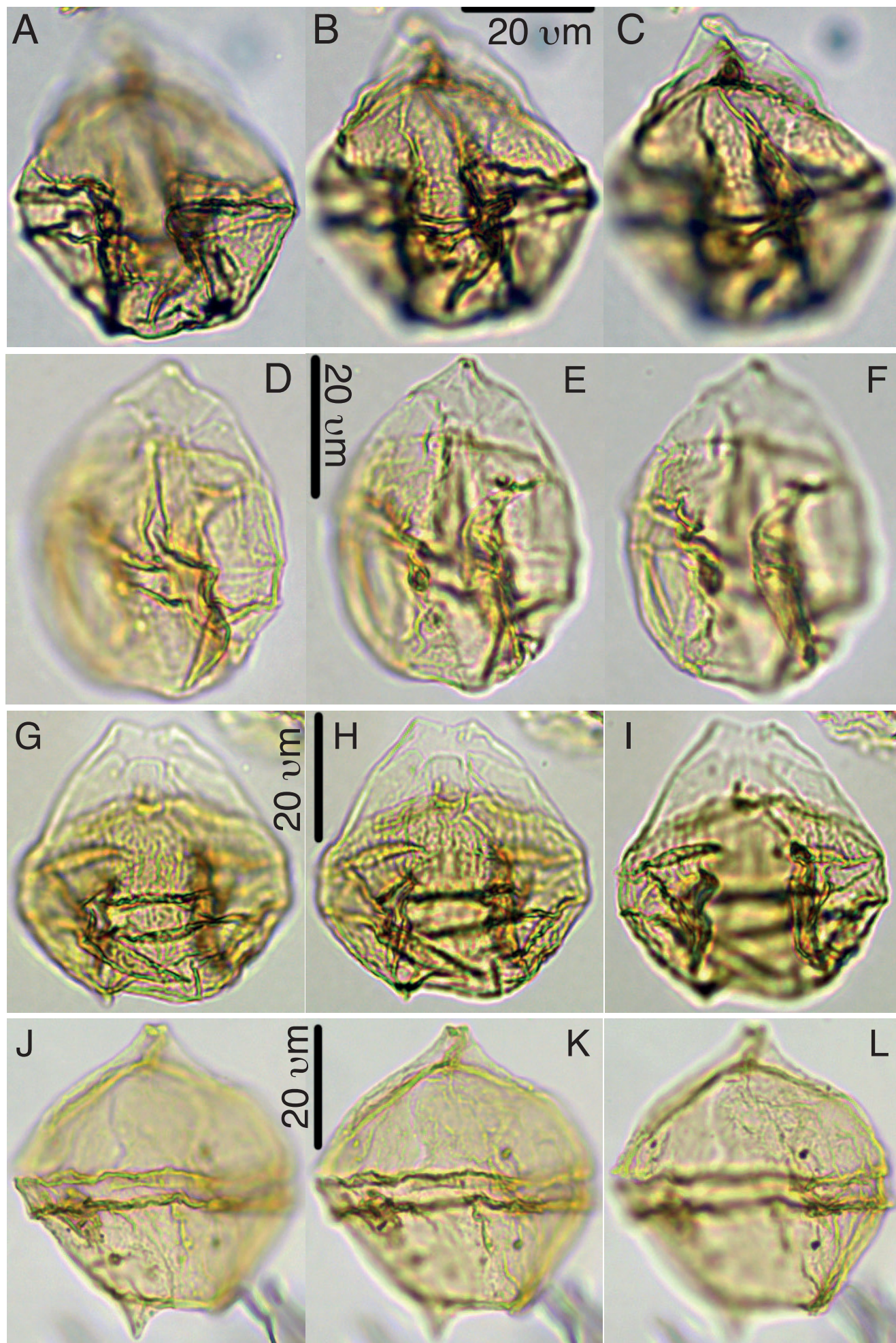


Plate S35. Representatives of the *Senegalinium* cpx. A-C: *Senegalinium dilwynense*, 27X-3-90/92 cm, slide 1, T18-3. D-F: *S. dilwynense*, 27X-3-90/92cm, slide 1, E22-1. G-I: *Senegalinium dilwynense*, 27X-3-90/92cm, slide 1, M15. J-L: *Senegalinium* spp., 32X-CC, slide 1, K29-4.

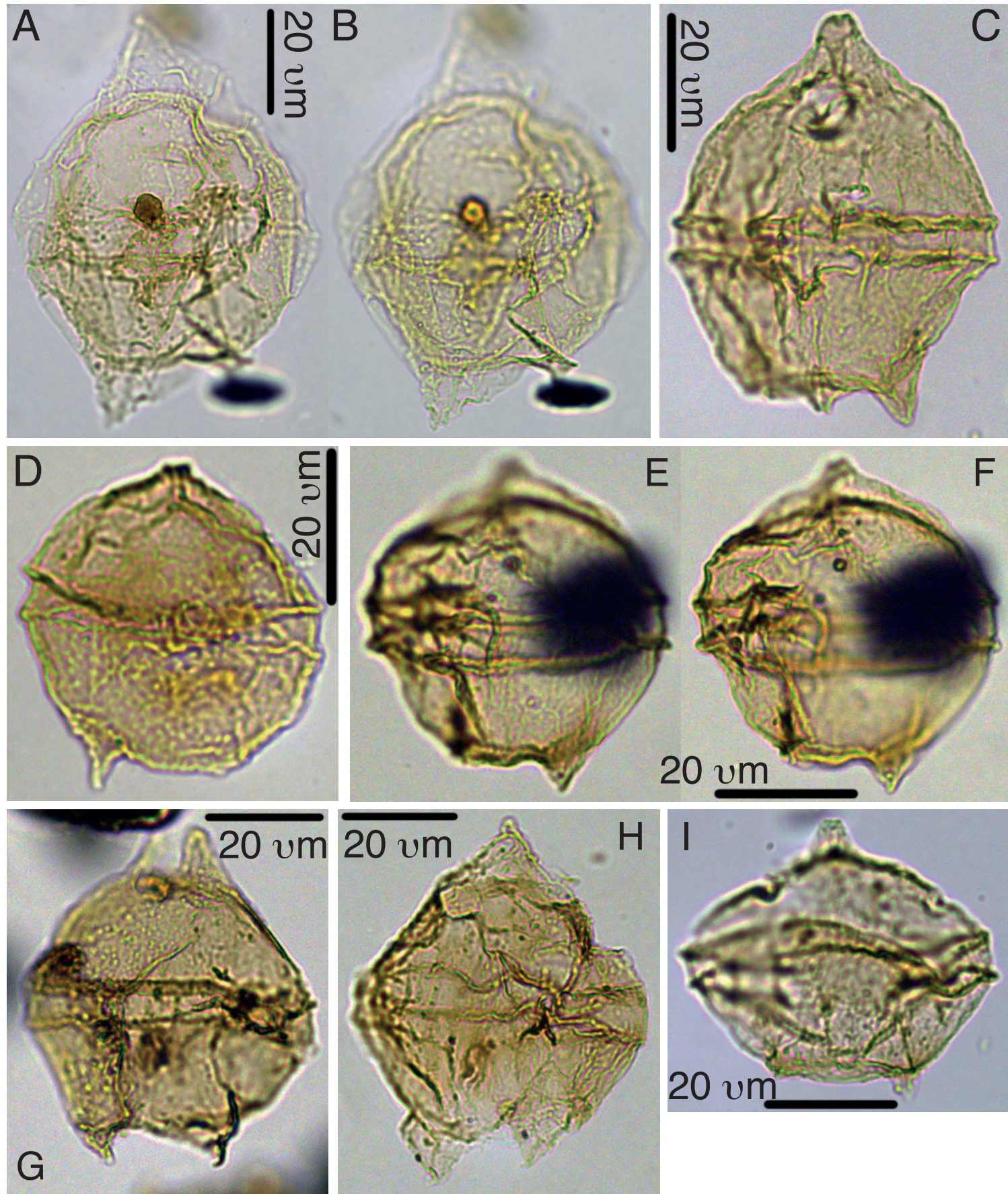


Plate S36. Representatives of the *Senegalinium* cpx. A-B: *Senegalinium* sp., sample 28X-2-40/42cm, slide 1, F36-1. C: *Senegalinium* sp., 33X-CC, slide 1, V13-1. D: *Senegalinium obscurum*, 33X-CC, slide 1, 2501110. E-F: *Senegalinium obscurum*, 33X-CC, slide 1, M16-4. G: *Senegalinium* cpx., 27X-1-0/2cm, slide 1, S22. H: *Senegalinium* cpx., 28X-2-130/132cm, slide 1, N18. I: *Senegalinium* cpx., 32X-2-80/83cm, slide 1, D26-4.

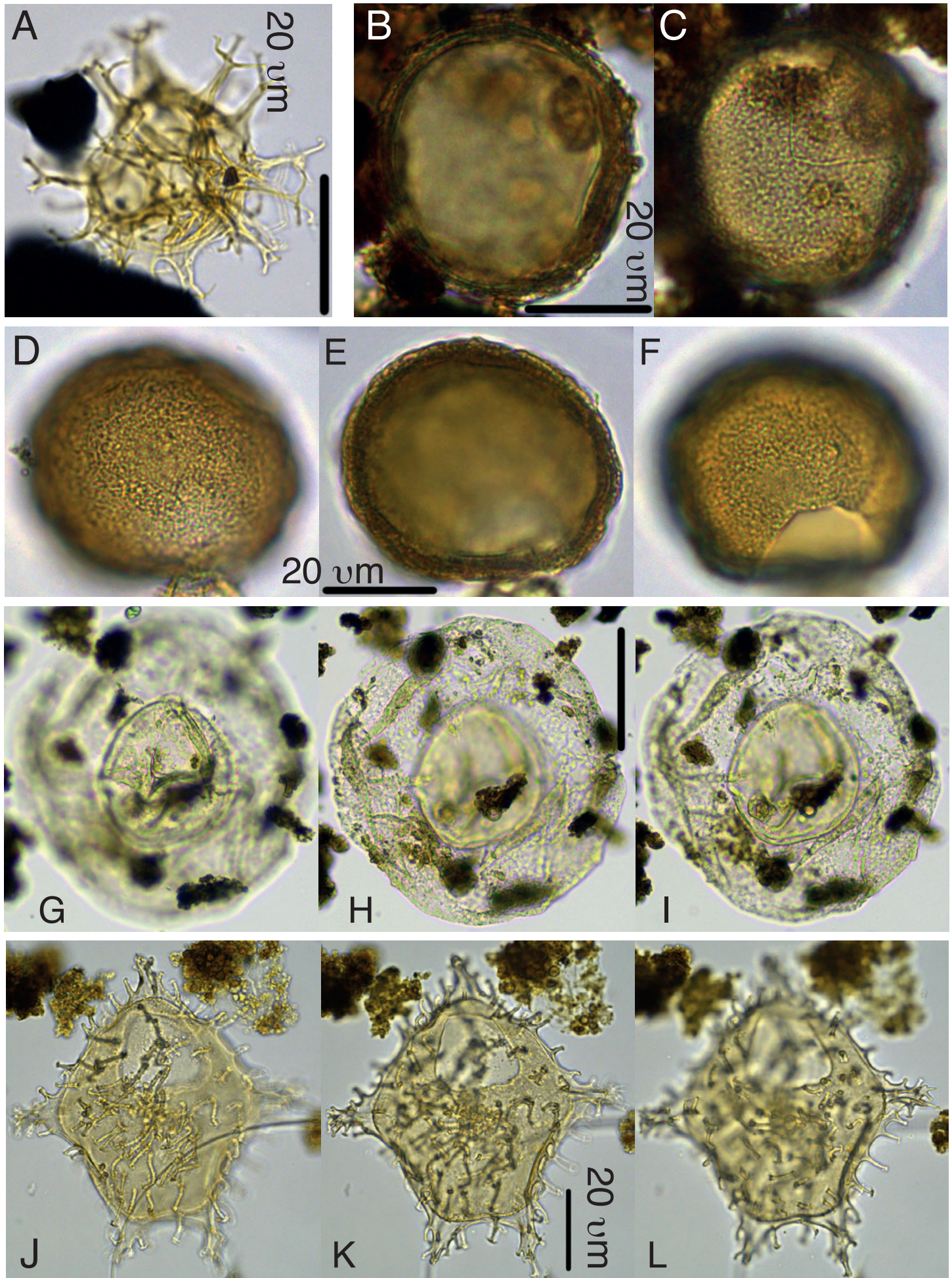


Plate S37. A: *Spiniferites* sp., 33X-CC, slide 1, F16-1. B-C: *Tectatodinium* sp., 27X-1-139/141cm, slide 1, P28-1. D-F: *Tectatodinium* sp., 27X-3-50/52cm, slide 1, N18-4. G-H: *Thalassiphora pelagica*, 27X-CC, slide 1, M26-3. J-L: *Wetzeliella articulata*, 27X-CC, slide 1, P16-1.

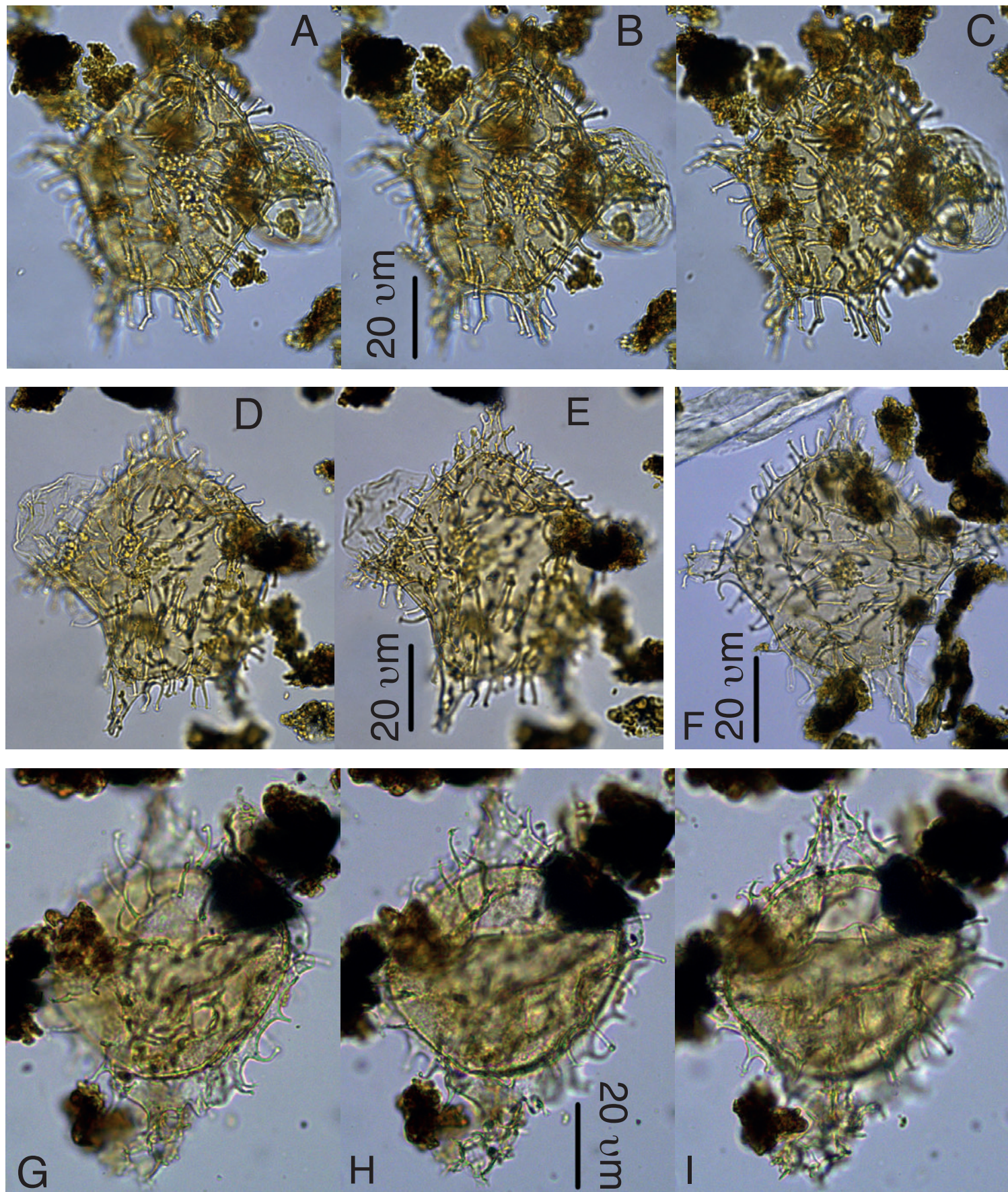


Plate S38. A-C: *Wetzeliella articulata*, 27X-CC, slide 1, C22-4. D-E. *Wetzeliella articulata*, 27X-CC, slide 1, F29-3. F: *Wetzeliella articulata*, 27X-CC, slide 1, F17-4). G-I: *Wetzeliella meckelfeldensis*, 27X-1-139/141cm, slide 1, P24-3).

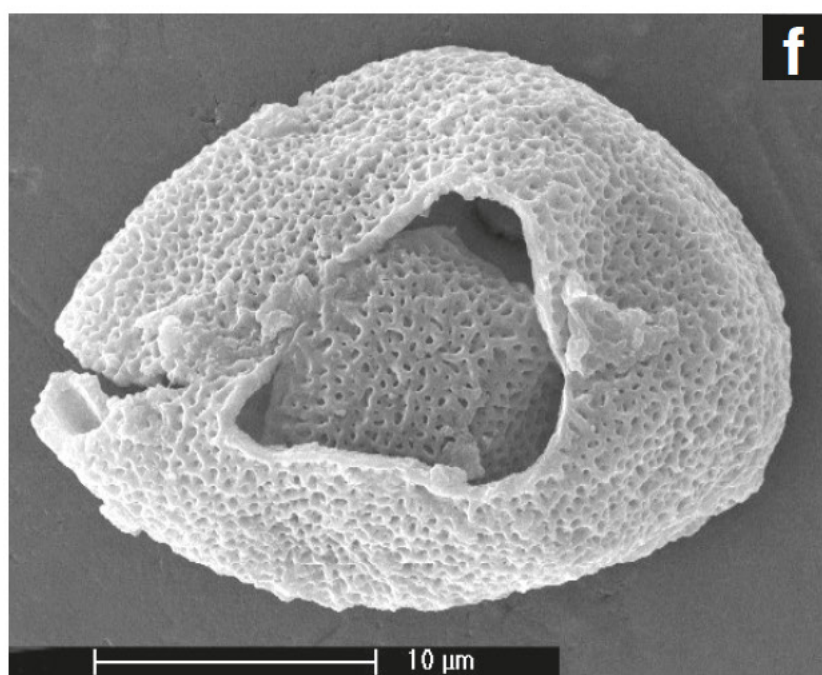
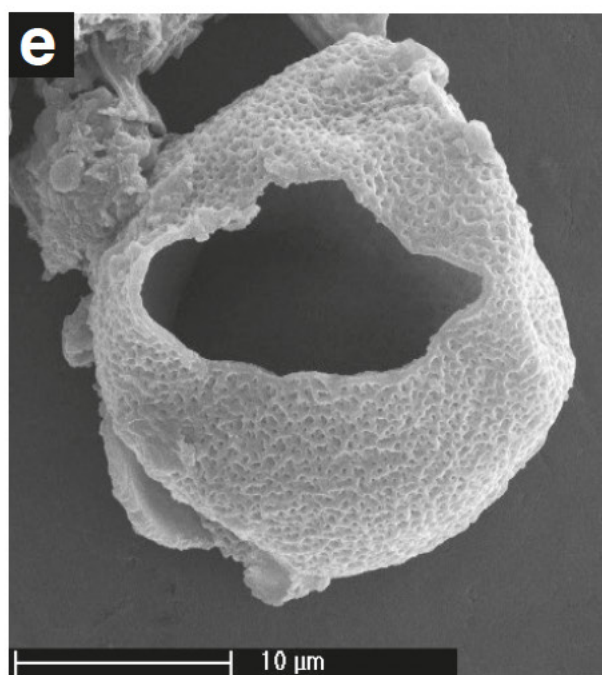
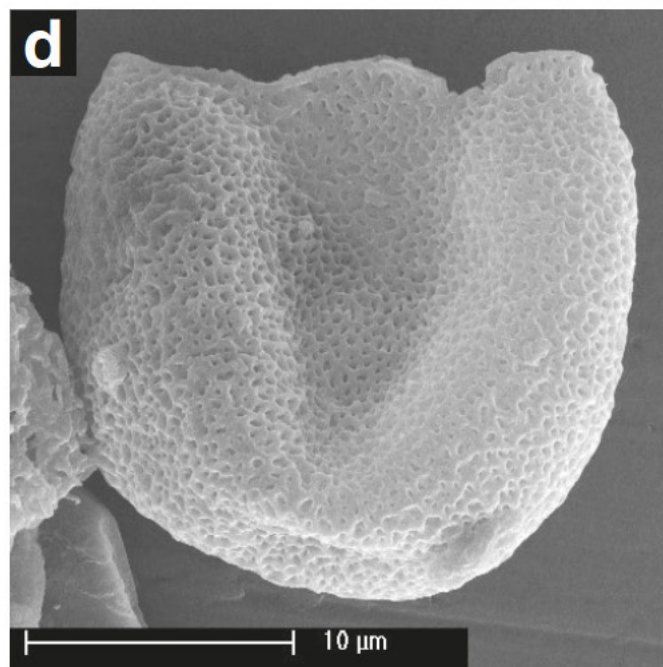
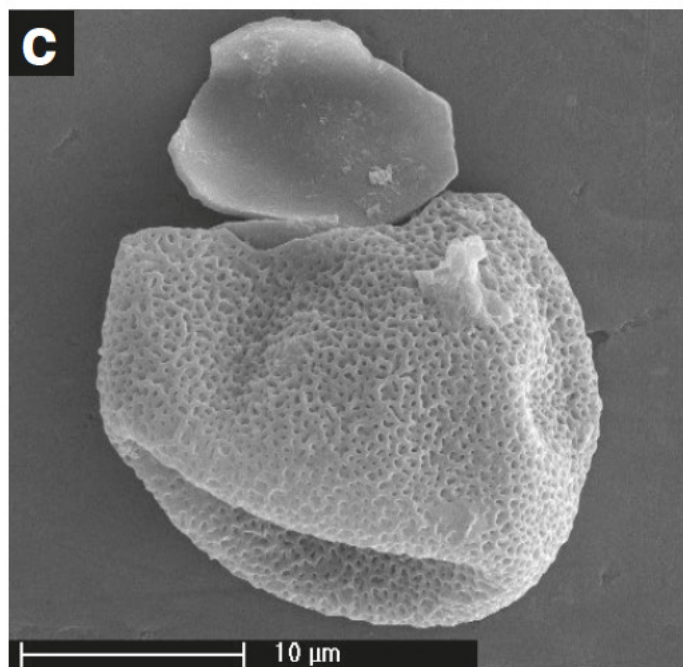
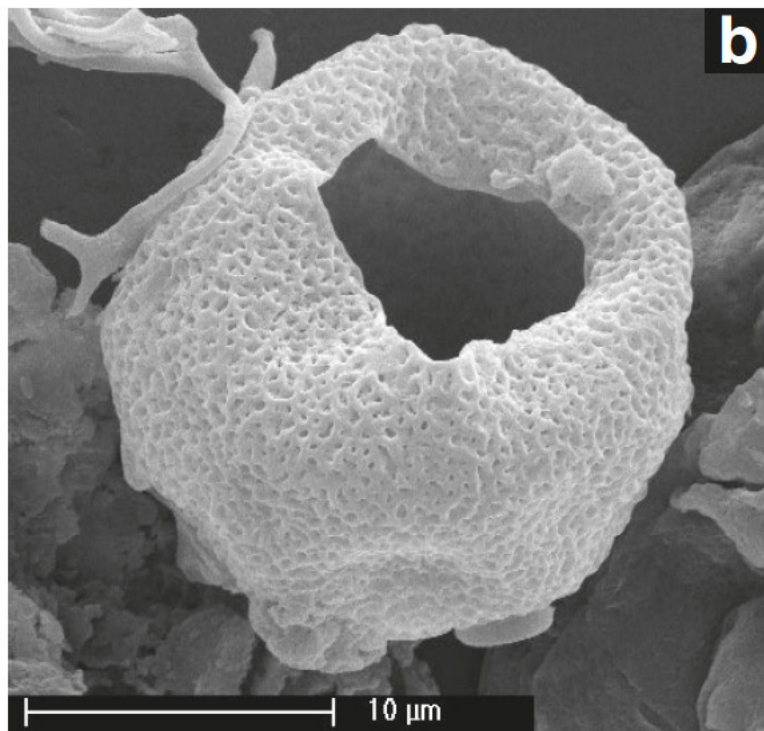
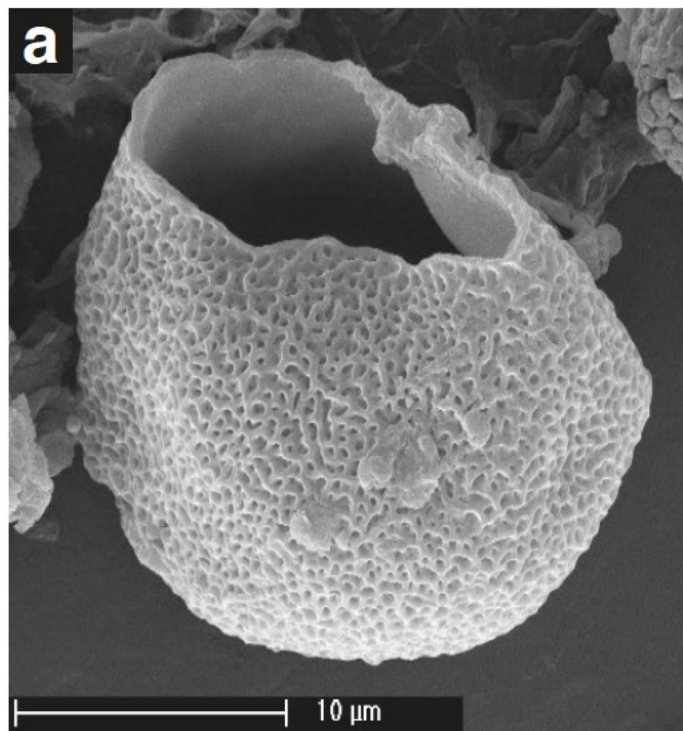


Plate S39. a-h. *Batiacasphaera obohikuenobiae* a: 27X-2W-98/100; b-f: 27X-2W-50/52

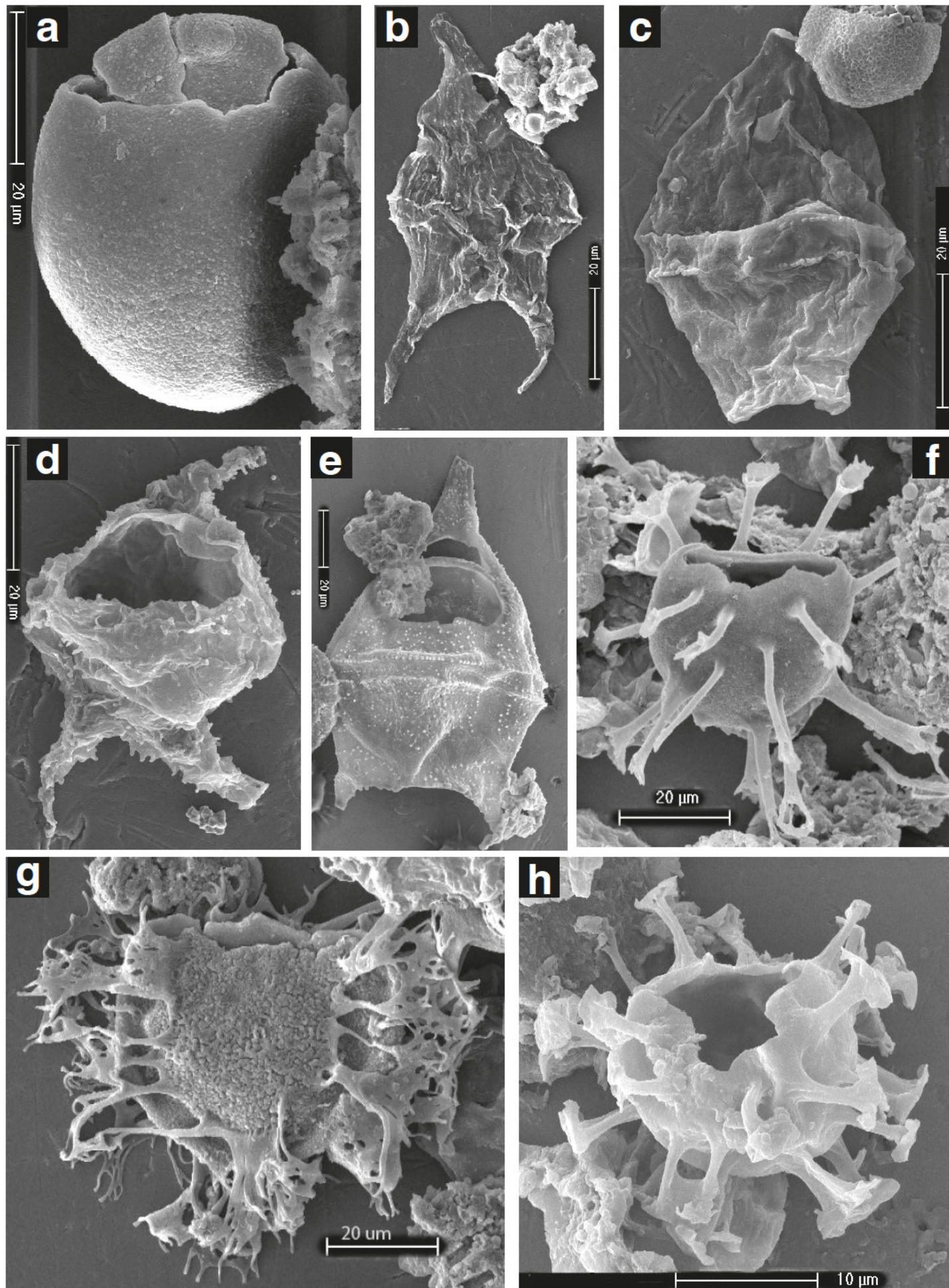


Plate S40. a) *Caligodinium aceras* (27X-2W-50/52) b) *Cerodinium depressum* (27X-2W-98/100) c) *Cerodinium* spp. (27X-2W-50/52), d) *Deflandrea denticulata* (27X-2W-50/52), e) *Deflandrea oebisfeldensis* (27X-2W-98/100), f) *Hystichosphaeridium tubiferum* (27X-2W-98/100), g) *Glaphyrocysta ordinata* (27X-2W-98/100), h) *Paucisphaeridium* cf. *inversibuccinum* (27X-2W-50/52)

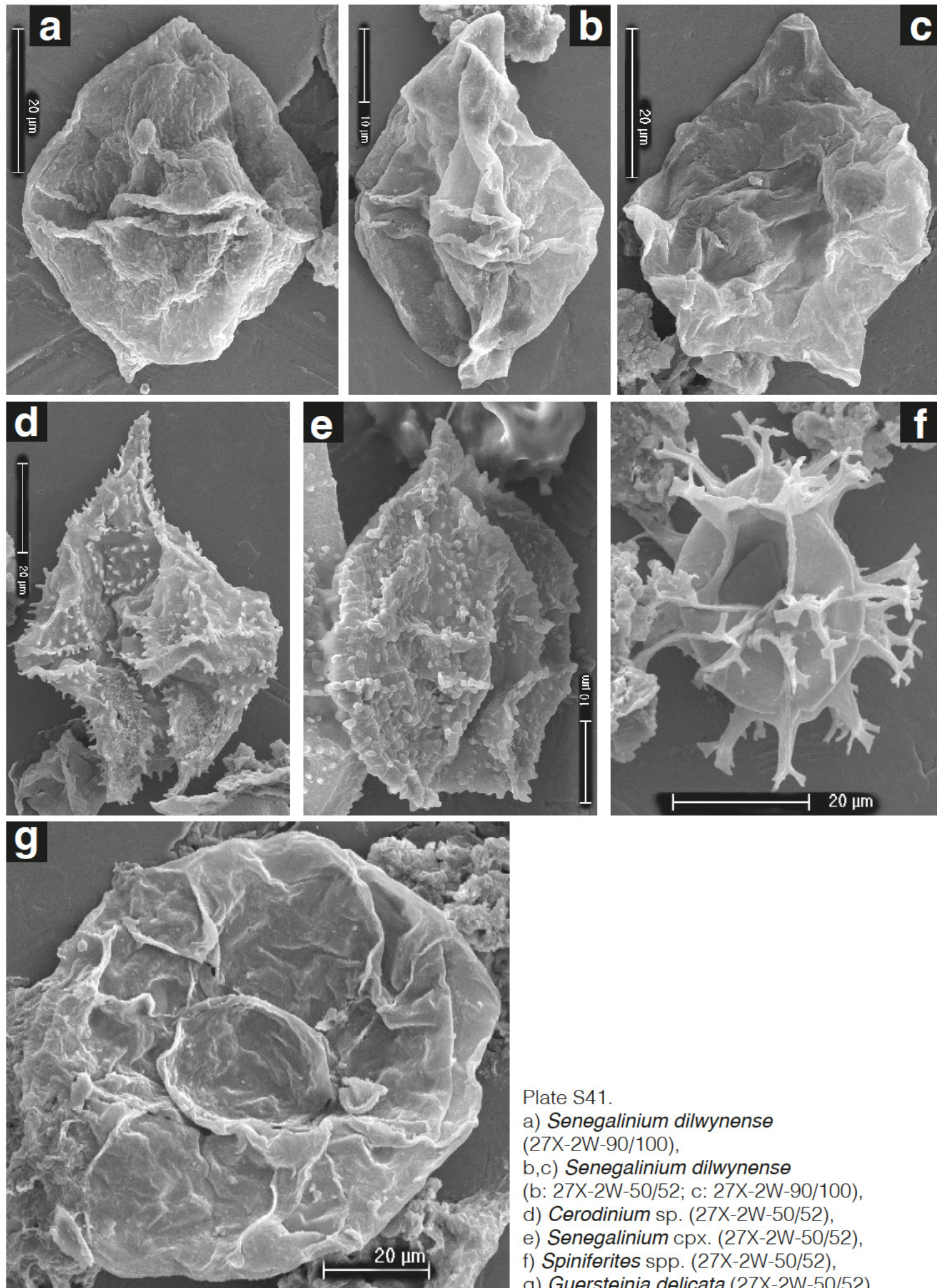


Plate S41.

a) *Senegalinium dilwynense*
(27X-2W-90/100),

b,c) *Senegalinium dilwynense*
(b: 27X-2W-50/52; c: 27X-2W-90/100),

d) *Cerodinium* sp. (27X-2W-50/52),

e) *Senegalinium* cpx. (27X-2W-50/52),

f) *Spiniferites* spp. (27X-2W-50/52),

g) *Guersteinia delicata* (27X-2W-50/52)