

A PRELIMINARY KEY TO SOME TEXAS POLLEN TYPES

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This key is to a series of references slides made during the summer of 1965 in the laboratory of Dr. Donald A. Larson, Department of Botany, The University of Texas. It is intended for limited use since it is only a preliminary guide to the identification of fossil pollen from Texas.

The nomenclature and format are patterned after Faegri and Iversen (1964). The measurements are usually of a single grain (the greatest dimension). Measurements of echinate grains do not include the spines.

1. VESICULATE, PINACEAE

- A. Body of grain > 100 u, cap 13 u thick at margins but thinner in middle Abies religiosa (281)*
- AA. Body < 90 u
 - B. No constriction at junction of bladder and body, no marginal creast, bladder with fine internal reticulum, body 75 u Picea sitchensis (318)
 - BB. With constriction and marginal crest, bladder with coarser internal reticulum, body < 70 u Pinus sp.
 - C. Distally verrucate, "belly worts,"
35 - 40 u Pinus cembroides (125)
48 - 50 u P. edulis (8)
 - CC. Distal verrucate absent, 60 u Pinus taeda (123)

2. POLYPLICATE, EPHEDRACEAE

- A. Ca. 15 straight "furrows," ca. 45 x 25 u
 - Ephedra aspera (241)
 - E. trifurca (240)
 - E. torreyana (319)
 - E. antisiphilitica (149)
- AA. Ca. 6 branches "furrows," ca. 50 x 22 u Ephedra nevadensis (315)

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3. INAPERTURATE

- A. Greater than 60 u
 - B. Psilate, 90 u Pseudotsuga taxifolia (316)
 - BB. Clavate, 75 u Jatropha dioica (243)
 - BBB. Coarsely reticulate, 60 u . Ruellia yucatanana (267)
- AA. Less than 60 u
 - B. Scattered gemmae, 25 u . . . Cupressus benthamii (211)
 - BB. Scabrate, 25 u Populus sp.
 - BBB. Verrucate, 34 u Aristolochia coryi (63)
 - BBB. Rugulate, 45 u Berberis trifoliata (55)

4. MONOCOLPATE

- A. Greater than 75 u, AMARYLLIDACEAE
 - B. Ends of grain without reticulum, 120 u Hymenocallis occidentalis (33)
 - BB. Reticulate throughout, 80 u. Agave lecheguilla (15)
- AA. 30-75 u
 - B. Scabrate, 50-60 u Yucca baccata (289)
Y. arkansana (11)
 - BB. Reticulate
 - C. Reticulum finer near furrow, 40 u Nolina texana (49)
 - CC. Reticulum uniform, 35 u Sabal minor (314)
 - AAA. Reticulate, 25 u Dasyilirion leio-phyllum (57)

5. TRICHOTOMOCOLPATE (no samples in collection)
6. MONOPORATE
- A. Scabrate, annulate, GRAMINEAE,
 28 u Andropogon sp. (325)
 40 u Stenotaphrum secundatum (323)
 40 u Tripsacum dactyloides (322)
- AA. Finely reticulate, not annulate,
 25 u Typha domingensis (145)
7. DICOLPATE (no samples in collection)
8. TRICOLPATE
- A. Psilate
- B. Breaks on either side of "pore" area,
 26 u . . . Leucophyllum frutescens (111,176)
- BB. Colpae geniculate,
 18 u . . . Quercus virginiana (185)
- AA. Scabrate-verrucate
- B. Small polar area, 25-30 u
 Phytolacca americana (77)
- BB. Large polar area
- C. Sculpture fine,
 27 u Cercocarpus breviflorus (232)
- CC. Sculpture coarser,
 22 u Quercus marilandica (201)
 25 u Q. gricea (161)
 25-30 u
 . . . Q. emoryi (169)
- AAA. Baculate, spheroidal, 30-35 u
- B. Thick exine
 Dichondra brachypoda (191)
- BB. Thin exine
 Echinocactus texensis (204)
- AAAA. Verrucate-spinulate, spheroidal,
 55 u . . . Echinocereus blanckii (177)

AAAAA. Reticulate

B. Gemmate-reticulate, short colpae,
75 u . Erodium texanum (116)

BB. Rugulo-reticulate, spherical, 35-40 u,
CACTACEAE
Mammillaria heyderi (184)
Neomammillaria hebrichiara (194)

BBB. Complete muri

C. Operculate, fine reticulum, LEGUMINOSAE

D. Prolate, large operculum, 38 x 22 u
Dalea frutescens (208)

DD. Oval, small operculum, 26 u
Brogniartia sp. (220)

CC. Not operculate

D. Greater than 50 u, coarse reticulum,
65 u
Menodora heterophylla (106)

DD. 25-30 u

E. Fine reticulum or psilate with
breaks in furrow membrane, de-
fined "pore" area, 26 u
Leucophyllum frutescens (176,111)

EE. Medium reticulum, 30 u
Acer grandidentatum (256)

DDD. Spherical, fine reticulum, 17 u
Drymaria debilis (234)
Porlieria angustifolia (248)
Halimolobus diffusus (311)
Sambucus coerulea (285)

9. STEPHANOCOLPATE

A. Four colpae (sometimes 5 in Fraxinus), reticulate,
large polar area

B. Fine reticulum, 20 u
Fraxinus texensis (65)
F. velutina (75)

- BB. Coarse reticulum with verrucas within muri,
35 u . . . Abronia angustifolia (221)
- AA. Six colpae, psilate, 22 u
Phacelia congesta (113)
- AAA. Eight colpae, echinae 4 u and with a hollow tip,
50 u Sicyos parviflorus (162)
10. PERICOLPATE
- A. Echinete, spines small and blunt,
40 u Portulaca pilosa (87)
- AA. Scabrate-reticulate, 30 u
Rivina humilis (235)
- AAA. Verrucate
- B. Perforate, spinulae (grains sometimes tri-
colpate) 55 u
Echinocereus blanckii (177)
- BB. Angular, 4 copae, 20 u
Coldenia hispidissima (219)
- AAAA. Rugulo-reticulate, with margo (grains sometimes
tricolpate) 35-40 u
Mammillaria heydeii (184)
11. DICOLPORATE (no samples in collection)
12. TRICOLPORATE
- A. "Pore" an equatorial bridge or a ragged opening
in colpus membrane if bridge ruptured, colpus
often geniculate, < 35 u
- B. Psilate
- C. Angulaperturate, large polar area,
25 u Phoradendron coryae (175)
27 u Aloysia lydioides (73)
30 u Verbena canescens (105)

- CC. Not angulaperturate, small polar area,
 13 u Koeberlinia spinosa (45)
 17 u Buddleia marrubiifolia (292)
 20 u Samolus cuneatus (263)
 30 u Chamaesaracha coronopus (273)
 30 u Diospyros texana (262)

BB. Scabrate

- C. Large polar area,
 19 u Cocculus carolinus (230)

- CC. Small polar area,
 27 u Cassia bahinioides (229)

BBB. Striate,

- 20 u . . . Fallugis paradoxa (233)
 23 u . . . Lycium berlandieri (287)
 27 u . . . Nicotiana trigonophylla (81)

BBBB. Reticulate

C. Reticulum medium

D. Margo present

- E. Small polar area, 30-35 u
Fouquieria splendens (51)

- EE. Greater than 25 u, 17 u
Salix gooddingii (236)
 22 u
Maurandya antirrhiniflora (274)

- DD. Margo absent, 20 u
Forestiera angustifolia (85)

CC. Reticulum fine

- D. Apiculate, angulaperturate,
 slightly striate, 20 u
Cleome gynandra (9)

DD. Not apiculate, oval

- E. Slightly striate, 34 x 23 u
Mentzelia multiflora (43)

- EE. Less than 25 u,
- 15 u Sambucus coerulea (285)
- 15 u Larrea divaricata (91)
- 18 u Sophora secundiflora (216)
- 19 u Cocculus carolinus (230)
- 20 u Reseda luteola (231)
- 20 u Lobelia brachypoda (286)
- 20 u Schaefferia cuneifolia (252)
- 22 u Cercis canadensis (250)
- 25 u C. occidentalis (247)

AA. Pore circular

B. Pore annulate

C. Verrucate-reticulate

- D. Large polar area,
- 26 u
- Sabatia campestris (120)

- DD. Small polar area,
- 40 u
- Leucaena retusa (210)
- 25 u
- Prosopis glandulosa (95)

CC. Reticulate

- D. Fine reticulum, angulaperturate,
- small polar area, 26 u
- Vitis rotundifolia (101)

- DD. Medium reticulum, 20 u

- E. Small polar area
- Lonicera albiflora (276)

- EE. Large polar area, equatorial
- furrow
- Houstonia nigricans (35)

BB. Pore not annulate

- C. Echinate, spines 1.5 u, pores indistinct,
- short spined, ca. 20 u, COMPOSITAE

- D. Furrows long
Iva ambrosiaefolia (180)
- DD. Furrows short
 - E. Long columellae
Iva texensis (170)
I. frutescens (301)
 - EE. Short columellae
Ambrosia artemisiifolia (298)
A. confertifolia (299)
- CC. Psilate-scabrate
 - D. Columellae distinct, prolate
 - E. Sexine thickest at equator,
30 x 20 u
Eriogonum annuum (77)
 - EE. Sexine thickest near poles,
23 x 16 u
Phyllanthus polygonoides (242)
 - DD. Columellae indistinct
 - E. Pores acentric, 15 x 13 u
Lappula redowskii (213)
 - EE. Pores equatorial, 25 x 20 u
Tournefortia hartwegiara (215)
- CCC. Reticulate
 - D. Peroblate, intruding vestibulae,
37 u
Tilia americana (284)
 - DD. Not peroblate
 - E. With 6 pseudocolpae, furrow
operculate, 60 u
Anisacanthus insignis (279)
 - EE. No pseudocolpae

F. Apriculate, angulaperturate,
fine reticulum, 26 u . . .
Vitis rotundifolia (101)

FF. Not apiculate, coarse
reticulum, striate margo,
34 u
Eustoma exaltatum (295)

AAA. Pore equatorially elongated

B. Echinate, COMPOSITAE-(TUBULIFLORAE)

C. Spines > 2 u, 22 u
Zinnia acerosa (297)
27 u Lindheimera texana (300)

CC. Spines < 2 u

D. Spines 1.5 u, furrow long, 30 u
Flourensia cernau (147)

DD. Spines ca. 0.5 u, distinctly
tectate, 30 u
Artemisia dracunculoides (310)

BB. Striate, RUTACEAE, 27 u
Ptelea trifoliata (246)
40 u . . Thamnosma texana (245)

BBB. Neither echinate or striate

C. Angulaperturate

D. Psilate, 20 u
Zizyphus mistol (266)
Rhamnus betulaeifolia (265)

DD. Reticulate

E. Less than 30 u
Ceanothus greggii (260)
Condalia ericoides (83)
Colubrina texensis (110)
Karwinskia humboldtiana (108)
Ptelea trifoliata (246)

EE. Forty microns
Thomnosma texana (245)

CC. Not angulaperturate

D. Reticulate

E. Pore and furrow short, both
of equal dimensions, spherical,
35 u
Garrya lindheimeri (293)

EE. Not so

F. Annulate pore in
equatorial furrow, 22 u
Houstonia nigricans (35)

FF. Not so, 27 u
Ptelea trifoliata (246)
30 u
Phyla incisa (268)
35 u
Ibervillea tenuisecta (171)
37 u
Lantana macropoda (269)

DD. Psilate-scabrate

E. Equatorial furrow present

F. Exine thickest at poles,
subprolate, 27 u
Polygonum convolvulus (304)

FF. Exine uniform, spherical
25 u
Solanum eleagnifolium (107)

EE. No equatorial furrow

F. Tectate, exine thinning
toward colpae, 20-30 u
Artemisia mexicana (305)
A. dracunculoides (310)
A. tridentata (321)

FF. Not strongly tectate

G. Large polar area

H. Perprolate,
equatorially con-
stricted, 33 x
16 u
Aletes acaulis (264)

HH. Not perprolate,
25 u
Lippia graveolens (109)

GG. Smaller polar area

H. Thick exine, margo,
distinct columel-
lae, 40 u
Euphorbia mauritanica (244)

HH. Thin exine, no
margo, indis-
tinct columellae,
30 u
Diospyros texana (262)

13. STEPHANOCOLPORATE

A. Some colpae without pores

B. Three of 12 colpae with pores, psilate, barrel-
shaped 22 x 16 u
. Heliotropium angustifolium (222)

BB. Three of 9 colpae with pores, striate, 22 u
. Heimia longipes (261)

BBB. Three of 6 colpae with pores, striate, 30 u
. Lythrum linearifolium (254)

AA. All colpae with pores

B. Six apertures, psilate, 23 x 19 u
. Lithospermum multiflorum (212)

BB. Four colporate, psilate-scabrate

C. Pore an equatorial bridge, 20 u
. Rhipsalis cassytha (187)

CC. Pore equatorially elongated and protruding,
20 u Bumelia lanuginosa (67)

CCC. Pore circular, pear-shaped, 25 x 20 u
. Tournefortia hartwegiana (215)

14. PERICOLPORATE (no samples in collection)
 Pericolporate types occasionally occur within species which are normally tricolporate.
- A. Echinate, tectate, Tubliflorae
15. DIPORATE
- A. Annulate, irregular scabrae, 18 u
 Morus microphylla (59)
16. TRIPORATE
- A. Vestibulate, > 60 u, ONAGRACEAE
- B. Vestibulum with parallel stripes, psilate-scabrate
- C. Grain concave, 125 u
 Oenothera speciosa (172)
- CC. Grain convex
- D. Vestibulum small, 75 u
 . . Jussiaea diffusa (163)
- DD. Vestibulum large, > 79 u,
 130u Gaura coccinea (186)
 100u G. macrocarpa (202)
- BB. Vestibulum not striped but constricted at junction with grain
- C. Pore a slit, slightly striate, 105 u
 Oenothera lammasana (182)
- CC. Pore round, baculate, 130 u
 Oenothera albicaulis (168)
- AA. Less than 50 u
- B. Psilate
- C. Vestibulate, 21 u
 Betula glandulosa (312)

CC. Not vestibulate

D. Annulate

E. Exine thin, 21 u
Maclura pomifera (239)

EE. Exine thicker, scabrate,
23 u
Celtis pallida (41)
27 u
C. laevigata (69)

EEE. Exine thick, punctate, 30 u
Gilia incisa (37)

DD. Not annulate, slightly heteropolar,
42 u Carya texana (205)

BB. Echinulate, spines 4-5 u, slit-like furrow within
an annulus, 40 u
. Arbutilon incanum (47, 173)
. Sphaeralcea angustifolia
(39, 327)
S. coccinea (328)
S. hastulate (329)

BBB. Reticulate, annulate with ridges around
annulus, 25 u Ayenia pusilla (253)

17. STEPHENOPORATE

A. Psilate

B. Vestibulate, a pair of archi between each of
4 or 5 pores, 25 u
. Alnus crispa (320)

BB. Not vestibulate, annulate, 3-5 pores,
23 u Celtis pallida (41)
27 u C. laevigata (69)

AA. Scabrate-punctate, 3-4 pores, annulate,
30 u Gilia incisa (37)

18. PERIPORATE

A. Psilate

B. Heteropolar, ca. 15 annulate pores,
32 u Juglans microcarpa (61)

BB. Not heteropolar, CHENOPODIACEAE and some
genera of AMARANTHACEAE

C. Annulate, ca. 14 pores, 25 u
. Sarobatus vermiculatus (308)

CC. Not annulate, usually > 20 pores
. most genera of CHENOPODIACEAE

AA. Rugulate-verrucate, ca. 12 pores with ragged mar-
gins, 55-70 u Opuntia leptocaulis (188, 207)

AAA. Verrucate, ca. 20 pores with annulae,
43 u Loeslia ciliata (283)

AAAA. Reticulate

B. Ca. 100 pores, high muri,
60 u Kallstroemia hirsutissima (21)
Allionia incarnata (224)

BB. Less than 30 pores, 60 u

C. Reticulum fine, ca. 20 pores with 4-7
islets on membrane,
38 u Liquidambar styraciflua (307)

CC. Reticulum coarse

D. Verrucae in lumina, ca. 16 pores,
45 u Polygonum punctatum (306)

DD. Lumina psilate, ca. 20 pores,
25 u Phlox roemeriana (117)

AAAAA. Echinata

B. More than 50 pores

C. Spines < 5 u, NYCTAGINACEAE

D. Ca. 50 pores, 140 u
. Anulocaulis leisolenus (226)

- DD. Ca. 100 pores, 90 u
 . . Oxybaphus albidus (29)
- CC. Spines > 5 u
- D. Spines acute and 18 u with baculae
 in between, 50-100 pores,
 65 u Hibiscus coulteri (189)
- DD. Spines on convex base and 8 u,
ca. 150 pores, 80 u
 . . Ipomoea costellata (167)
- BB. Less than 40 pores
- C. Annulate, ca. 12 pores, MALVACEAE
- D. Pores in rows, 100 u
 . . Gossypium hirsutum (17)
- DD. Pores not in rows, 60 u
 . . Sida neomexicana (288)
- CC. Not annulate
- D. Thin exine, 6-12 pores, spines
 5 u, 150 u
 . . Cucurbita texana (181)
C. foetidissima (183)
- DD. Thick exine, 12 pores,
 NYCTAGINACEAE
- E. Ca. 30 pores, spines 1-2 u,
120 u
Cyphomenis sp. (217)
- EE. Ca. 15 pores, spines 4 u,
70 u
Boehavia erecta (23)

19. SYNCOLPATE

- A. Ca. 8 pores in colpae, dice-like, 35 u
 Janusia gracilis (251)

- AA. Pores absent
- B. Fingerprint striae, single encircling colpus,
33 u Krameria glandulosa (249)
- BB. Coarsely reticulate, several colpae
50 u Chilopsis linearis (115)
20. HETEROCOLPATE (no samples in collection)
21. FENESTRATE, COMPOSITAE-LIGULIFLORAE
- A. Echinulate with 3-6 polar spines, with equatorial
ridge (Taraxacum type of Wodehouse, 1935)
30-35 u Crepis petiolata (325)
Sonchus oleraceus (343)
22. DYADS (no samples in collection)
23. TETRADS
- A. Persistent perisporium,
100 u Selaginella lepidolphylla (104)
- AA. No perisporium
- B. Psilate-scabrate,
40-50 u Arbutus menziesii (290)
A. texana (294)
- BB. Spinulate,
50 u Drosera annua (309)
- BBB. Reticulate, monoporate,
40 u Typha latifolia (237)
24. POLYADS, LEGUMINOSAE
- A. Eight grains, not spherical
- B. One grain elongated, 150 x 90 u
. Calliandra eriophylla (228)

- BB. Seventeen x 14 u . . . Mimosa biuncifera (128)
- AA. Sixteen grains, spherical,
40 u Acacia greggii (174)
- 25. MONOLETE, POLYPODIACEAE
 - A. Grain 27 u, thin wrinkled perisporium
. Phanerophlebia umbonata (203)
 - AA. Grain > 35 u
 - B. Perisporium wrinkled with high crests,
50 u Polypodium thyssanolepis (190)
 - BB. No distinct perisporium, grain scabrate,
38 u Woodsia mexicana (197)
- 26. TRILETE
 - A. Perisporium fused with grain and verrucate-
regulate, spheroidal, 50 u, OSMUNDACEAE
. Osmunda regalis (317)
 - AA. Perisporium deciduous, grain angular, POLYPODIACEAE
 - B. Perisporium wrinkled with high crests,
55 u Pellaea atropurpurea (99)
 - BB. Perisporium verrucate, 45-60 u
. Adiantum capillus-veneris (209)
Cheilanthes lindheimeri (206)
Notholaena sinuata (114)
 - BBB. Perisporium psilate to slightly wrinkled,
35 u Bommeria hispida (195)

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