

DIAGNOSTIC COUNTING FORM (3/2005)

(with examples of taxa producing the types and MU Phytolith Data Base Record—R—numbers)

Slide # _____ Scanner _____ Project _____
Date _____ Microscope _____ Provenience _____
Starting point _____ Total short cells _____ Charcoal _____
Stopping point _____ Total phytoliths _____

OPEN HABITAT

TOTALS

Asteraceae

- Darkened perforated bodies (21IBb; R5) _____
- armed, segmented hair (40IIIBa1; R1,2,3,4) _____
(2206, *Eupatorium capillifolium*; *Lipochaeta*)

Cucurbitaceae/Asteraceae

- Multicellular large non-armed hair, segmented, smooth (40IIIBa201; R6,16,17,21,22) _____
- spherical hair base with smaller, rounded epidermal cells (40IVD; R15,15,18) _____
(*Cucurbita* sp., *Lipochaeta*)

Musaceae

- Heliconia* trough bodies, elliptical & elongated (80IIAa,b,c; R38,39,207,208) _____
(E1066 *H. curtispatha*; 2741,2 *H. latispatha*)

ARBOREAL

Annonaceae

- Faceted irregular hemispheres (80IFb3; R52) _____
(2106 *Dugetia*; 448 *Annona muricata*)

Arecaceae

- Spinulose spheres (80ID; R53) _____
(1125 *Cocos nucifera*)
- Conical bodies, spheroidal, 1-5 projections (80IIIA; R54,200,201) _____
(E1062 *Bactris*)

Bataceae

- Batis* round, oval sphere, bumpy surface, dark center with projection (60IIFa; R7) _____
(E1034 *Batis maritima*)

Bignoniaceae

- hair base with stellate center, short projections, with or w/out crystal (40IVFa; R230) _____

Bombacaceae

- nodular spheres with large irregularly shaped nodules (80ICb) _____
- serrate spheres (80ICc; R48,49,75,76) _____
(813, 4 *Pseudobombax millei*)
- hair base, large central cell surrounded by smaller cells, rounded (40IVBa401; R226,236) _____
- triangular-cupped epidermal bodies (20VD; R150,151) _____
- stomata with 4 large turgid subsidiary cells (120IIA; R106,146-9) _____
(1367a *Pachira aquatica*)

Huberodendron

- hair base with large center and 1 row of attached cells (40IVBa201c; R224) _____

Pachira

- hemisphere with irregular cavities (80IFb202; R145)_____
 - hair base with angular rim (40IVAa300; R152,153)_____
- (1367 *Pachira aquatica*)

Pseudobombax

- small single outline cone-shaped trichome with enclosed cystolith (40IIBc3; R47,72)_____
- (813 *P. millei*)

Matisia longipes Little (1366, 1406)

- unicellular hair, short to medium, smooth surface, base flat and small, top and base simple, curved (40IIIAa202Ba2; R167)_____
- unicellular hair, long (40IIIAb200Ab2; R168)_____

Quararibea

- segmented hair; tip blunt and broad (40IIIBa203; R170,171)_____
 - hair base with radiating appendages, surrounding cells attached to form a disk; small, darkened (40IVAA201Aa; R172)_____
- (E1079) *Q. cf. grandifolia*)

Boraginaceae

Cordia and Heliotropium

- Trichome, unicellular, double outline, armed (40IAb; R109,110,111,218,238-9)_____
- (470, 1 *Cordia lutea*; 468 *C. hebeclada*; 473 *C. alliodora*; E227 *Heliotropium angiospermum*)

C. hebeclada (slide 468)

- hair base with concentric ring and regular projections (40IVBa402B2; R108,211,213-4,228)_____

C. lutea (slide 470, 471)

- unicellular hair, long, curving, interior space, armed (40IIIAb100; R204,220)_____
- hair base with large central cell (40IVBa200; R112,212)_____
- conical body, oval, rounded triangle (20VCd; R203,204)_____

C.cf. polyantha

- highly silicified multiple cell hair base (40IVBb1; R229)_____

Heliotropium

- long grainy hair (40IIIAb201; R223)_____
- hair base with concentric ring pattern (40IVBa402A2; R227,235)_____

Burseraceae

- short roughened unicellular hair (40IIIAa100A; R219,237)_____
 - Faceted, hemispheres (80IFb200; R231,241)_____
- (64 *Trattinnickia glaziovii*; 58 *Dacryodes occidentalis*)
- seed epidermis, fine surface decoration; prominent low projection (22IC,D; R8,9,162-4)_____
- (64 *Trattinnickia glaziovii*; 2351 *Protium fimbriatum*)

Trattinnickia

- double-outline trichome, angular base (40IBf; R135)_____
- hair base with surrounding cells (40IVAa201B; R133-4)_____
- hair base without surrounding cells; central cell overlaid with small cell; tall (40IVAa200B; R136-7)_____

Chloranthaceae

•seed epidermal cells, irregularly thick (puffed); entire surface with beadlike projections (22VI; R159,160)_____

•large three-dimensional blocky bodies (60III; R165-6)_____

(*Hedyosum guaduatyatum*)

Chysobalanaceae/Cannaceae

•smooth, small sphere (80IAa1; R12,13)_____

(common in 2162a *Licania platypus*, 2628 *Chrysobalanus icaco*; some overlap with *Canna*)

Cystoliths (100IA, 100ICb, 100ID; R50,73,74,107,169,232)_____

(Ulmaceae, 466,7 *Trema micrantha*; Bombacaceae, *Pseudobombax millei*; *Quararibea grandifolia*; *Matisia longipes*; Moraceae, *Ficus americana*)

Dichapetalaceae

•angled, blocky non-quadrilateral; broad faceted branches (24IIHa; R25-7,198-9)_____

(MBG 53 *Tapura peruviana*, 2231 *Stephanopodium longipedicellatum*, 2236 *S. peruvianum*)

Ebenaceae

•hemispherical faceted body with flat ventral surface (80IFb201)

(2297 *Diospyros meloninii*)

Euphorbiaceae (small trees, shrubs)

•multi-faceted blocky quadrilateral, spheroidal in rotation (24IC; R30,31,55-7)_____

(432 *Croton fraseri*; 438 *Amanoa anomata*)

Croton fraseri

•segmented smooth hair; interior spaces; roughened edges (40IIIBa202; R58)_____

Cleidion

•unicellular hooked hair, double interior space (40IIIAa302)_____

(*C. castanneifolium*)

Fabaceae

Brownea

•epidermal quadrilateral, long sinuous edges, grainy surface (10IDd; R215)_____

•hair base, rounded or elliptical cells, central cell large, surrounded by smaller cells; 2 layers thick from the side (40IVBa201B; R66)_____

•hair base, rounded or elliptical cells; small multiple central cells (highly silicified); 2 layers thick from the side (40IVBb3; R67)_____

(*Brownea ucayalina* 1772b)

Dialium

•unicellular hair, short to medium length, acute tip, no interior space, armed (40IIIAa101Ba; R68)_____

•unicellular hair, short, sharply recurved (40IIIAa300B; R69)_____

•unicellular hair, no interior space, blunt tip, grainy surface, “scaled” appearance (40IIIAa202Bc; R70)_____

•hair base, rounded cells, large central cell surrounded by small elongated cells; 1 layer thick from the side (40IVBa201A; R71)_____

(1766 *Dialium guianense*)

Inga

- epidermal cell with bulbous projection (11IAa; R183-4)_____
 - hair base with quadrilateral surrounding cells; darkened; tall in side view (40IVAA201Ab; R186-7)_____
- (*I. densiflora*)

Flacourtiaceae

- cystolith, hemispherical with base, mimics bilobate (100IBa1; R138)_____
 - cystolith, hemispherical round/elliptical from top (100IBa2; R139-140)_____
 - cystolith, hemispherical, verrucose surface (100IBb)_____
 - unicellular long hair, non-armed, smooth, double interior space (40IIIAb200Aa1; R115)_____
 - hair base, double concentric ring; outer ring angular, short projections (40IVAA301; R144)_____
 - small hair base; surrounding cells form disk; cells angled (40IVAA201C; R142-3)_____
- (41 *Casearia sylvestris*; 1377 *Pleuranthodendron lindenii*; *Pueraria phaseoloides*, *Tetrathylacium macrophyllum*)

Humiriaceae

- smooth polyhedral cells with perforations (20IBc; R216)_____
- (*Humiriastrum procerum*)

Hymenophyllaceae

Trichomanes

- trough-shaped cell (60IIS)_____
- (*T. pinnatum*)

Lauraceae

- seed epidermis, angled to irregularly quadrilateral, small edge projections (22IF; R190-1)_____
 - hair base, polyhedral center (40IVAA203; R182)_____
 - non-quadrilateral epidermis with rounded projections (20VE; R192-3)_____
 - very large smooth sphere, striated (80IAa3; R189)_____
- (*Beilschmiedia alloiophylla*; *Chlorocardium venenosum*, *Aniba hostmanniana*, *Caryodaphnopsis fosteri*)

Marantaceae

Marantaceae/Bombacaceae

- nodular spheres; irregularly spaced nodules (80ICa; R51,59,77,78,93,97,101)_____
- (2035 *Maranta gibba*, 2023 *Calathea crotelifera*, 2672 *C. allouia*, 2720 *C. inocephala*; 1370, 1 *Ochroma pyramidalis*, 813, 4 *Pseudobombax millei*)

Marantaceae

- rough spheres to irregularly flattened bodies with nodules and ridges (80ICd)_____
 - hat-shaped bodies, conical, rugulose surface (80IIIB; R59,88,93,96)_____
- (2595 *Calathea lutea*, 2023 *C. crotelifera*, 2672 *C. allouia*, 2720 *C. inocephala*; 2035 *Maranta gibba*)

wild Marantaceae (i.e., not *M. arundinacea*, *C. allouia*)

- seed body, corkscrew twist along axis, ciliate surface, cylindrical, no stalk (22VIIBa; R102-4)_____
 - seed body, cylindrical, variable tip, shaft straight along axis (22VIIBb; 90,91,99,100)_____
- (2024 *Calathea crotelifera*, 2028 *C. marantina*, 2032 *Ischnosiphon inflatus*)

Moraceae

- hair, armed, bent rather than curving (40IIIAb101; R35,36)_____
- stellate-centered hair bases, with long projections (40IVFc)_____
- (141 *Ficus maxima*)
- hair base with very small stellate center embedded in well silicified body (40IVFd; R37)_____
- (687, 1129 *Artocarpus altilis*)

Sclerids (110; R116,117,173,178-9,180,196-7)_____

(MBG53 *Tapura peruviana*)

Sterculiaceae

- hair base; long radiating appendages; large open center (40IVAa202; R34)_____
- (*Guazuma ulmifolia*)

Ulmaceae

- Celtis schippii* (462, 463)
- anticlinal seed epidermal cells (22IE; R64,217)_____
 - hat-shaped body, rounded, conical, bottom flattened and elongated
 - (20VCa,b,c; R61-3,209)_____

Trema

- unicellular hair, unarmed, straight; smooth, acute tip and V-shaped base
- (40IIIAb200Bb; R44,45,222)_____
- hair base with large central cell subdivided around edge (40IVBa400; R225,240)_____
- isodiametric center hair base (40IVBa3; R46)_____
- (464-467 *Trema micrantha*)

ECONOMIC (record coordinates for each; photograph)

Cannaceae

- Canna* smooth, large spheres (80IAa200, 201; R11,233)_____
- (80IAa200: 511, 80IAa201: 2591, 2639; all *C. edulis*)

Cucurbitaceae (*Lagenaria siceraria*, *Cucurbita* sp.)

- broken Cucurbitaceae sphere (80IFb101A)_____

Cucurbitae tribe

- faceted sphere (80IFb102)_____

Lagenaria siceraria

- faceted sphere, elongated facets (80IFb100; R19,20)_____

Cucurbita spp.

- faceted sphere, small (wild) 43-74 microns (80IFb101Ba)_____
- faceted sphere, large (domesticated), 50-100 microns (80IFb101Bb; R174-5)_____

C. ficifolia

- faceted sphere, very large; smaller hemisphere barely scalloped; small scallops on larger hem. (80IFb101Bc)_____

Sicana odorifera

- faceted sphere; smaller hemisphere conical in profile (80IFb101C)_____

Dioscoreaceae

Dioscorea

- elongate, undulating root body (26IIA) _____
(2577 *Dioscorea* sp.)

Euphorbiaceae

Manihot

- small, heart-shaped secretory body (160I; R257,269-72) _____
(a variety of *Manihot esculenta* slides)

Fabaceae

Phaseolus

- unicellular hair, hooked end, intercellular space, small (40IIIAa300A; R32,33,205-6) _____
(1466, 2606 *P. lunatus*)

Marantaceae

Maranta, Calathea

- irregular rhizome cylinder; decorated surface; abruptly narrowed tip
(26IAa; R242,258) _____
(2672 *C. allouia*)
- flat domed rhizome cylinder; ciliate or beaded decoration; distinctive, smooth head
(26IAb; R243,259-61) _____
(2672 *C. allouia*)
- rhizome spindle; cylindrical, tapers gradually to pointed tip; nodular surface
(26IB; R244) _____
(2720 *C. inocephala*)
- flattened nodular body (80ICd) _____
(2732 *M. gibba*)

Maranta

- seed body tips (22VIICa) _____
(2038 *M. arundinacea*)
- seed epidermis; smooth/solid cylinder shaft, long (22VIIAa; R79-83) _____
(2036 *M. gibba*)

M. arundinacea (2038)

- seed epidermis; smooth/solid cylinder shaft, shortened, grainy surface (22VIIAb; R84-6) _____

Calathea

- seed body tips (22VIICa, Cb, Cc; R98, 157) _____
(2347, 8 *C. allouia*; 2022 *C. altissima*)
- diagonally scored rectangular body (60IB; R87,89) _____
(2027, 8 *C. marantina*; 2594, 5 *C. lutea*)
- seed body, cylindrical, shortened, irregular end, tip acuminate or acute (22VIIBc1; R94,95) _____
(2022 *C. altissima*)
- flat rhizome type; decorated, beaded edge; elongate, irregularly stellate center
(26IIB; R245,262-3) _____
(2672 *C. allouia*, 2725 *C. marantifolia*)
- verrucate sphere (80IJ; R246) _____
(2672 *C. allouia*, 2725 *C. marantifolia*)

C. allouia (2347, 8)

•seed body; shaft twisted/broken irregularly; broad, blunt tip; granular surface (22VIIbC2) or flattened grainy tip and thin spines (22VIIbC3)(R156,158)_____

Musaceae

•*Musa* trough bodies, squared or rounded (80IIbA; R40-2)_____
(*Musa* domesticated)

Poaceae

Zea mays

•wavy-top rondel (30IIbE, R105,118,119)_____
(2065, 2077, 2089, 2385)

•gracile spherical body (22VIIIa, R128)_____
(2078, 2383)

Zea spp. (maize and teosintes)

•ruffle-top rondel (30IIbF; R120,121)_____

(2065, 2077, 2089, 2385, 2409, 2411, 2419)

•half-decorated rondel (30IIbG; R122,123)_____

(Slides 2409, 2411, 2449)

•half-decorated oblong body (22VIIIc; R131)_____

(2409, 2411)

•robust globular body (22VIIIb; R126,127)_____

(Slides 2397, 2409, 2411, 2449)

Zea spp. and some other Panicoid grasses

•rectangular IRP, wide (> 7.5 microns) (22VIIIa; R124)_____

•irregular IRP (22VIIIb; R125)_____

(Slides 2063, 2069, 2409, 2411, 2449)

Zea spp., teosinte

•blocky body, semi-circular cuts (22XA; R132)_____

(Slide 2411)

WET HABITAT

Cyperaceae

•leaf epidermis (20VA; R23,24)_____

(E983 *Torulinium odoratum*)

Scirpus

•polyhedral seed epidermis; tall smooth conical projection; edges decorated or recurved (22IIb; R113,114)_____

Cyperus

•polyhedral seed epidermis, entire upper surface decorated (22IIa)_____

Carex

•polyhedral seed epidermis, edges of upper surface decorated (22IIab)_____

Diatoms (90IIb) Tally outside the sum; may be subdivided by shape_____

Sponge spicules (90IA) Tally outside the sum_____

MISC. INDICATORS

•rugulose spheres (80IB; R60,202) _____
(2035 *Maranta gibba*, 2720 *Calathea inocephala*)

•Zingiberales irregularly angled/folded spheres (80IEa; R10) _____
(511 *Canna edulis*)

TISSUE-LEVEL TYPES (artifact, dental calculus studies)

Root/tuber

•blocky parenchyma (130I; R249) _____
(2574, 2578 *Dioscorea* sp., 2564 *Colocasia esculenta*, 2704 *Calathea crotalifera*)

•multiple-lobed parenchyma (130IIA; R250) _____
(2633 *Xanthosoma*, 2564 *Colocasia esculenta*)

•straight transport elements (140IIA; R253,267) _____
(2564 *Colocasia esculenta*, 2572 *Pachyrhizus erosus*, 2723 *Calathea macrosepalia*)

Fruit/seed

•undulating transport elements (140I; R252,266) _____
(2624 *Spondias purpurea*, 2628 *Chrysobalanus icaco*, 2653 *Inga spectabilis*)

•fiber bundles (150I; R255) _____
(2637 *Bixa orelliana*, 2655 *Canavalia*, 2660 *Acacia macrocantha*)

•fibrous mesh (150II; R256,268) _____
(2660 *Acacia macrocantha*, 2669 *Arachis hypogaea*; *Chrysobalanus icaco*)