

CATEGORY 80

Stigmata and Other Spheres

80I. spheres/spheroidal

80IA. Smooth surface

- a. well-silicified; opaque (when viewed overlapping another phytolith)
 1. small (12 microns or less; typical size 4-6 microns), smooth to slightly irregular surface (not rugulose; irregularity may be localized); may be angled, indented (sometimes crater-like), flattened, elongated (off-spherical), or appear as two joined disks (PC152 *Hirtella*) (Chrysobalanaceae/Cannaceae/*Bixa*, mixed type)
 2. large (> 12 microns)
 00. original *Canna* type, based on an archaeological leaf specimen from coastal Peru; roughened surface, thick, darkened center; 20-30 microns (Cannaceae, *Canna edulis*, genus level diagnostic)
 01. type based on modern *Canna* leaf specimen; smoother, opaque but not dark like 00 (Cannaceae, *Canna edulis*, genus level diagnostic)
 3. very large, 40 micron diameter, striated surface (Lauraceae, *Beilschmiedia alloiophylla*, family level diagnostic)
- (80IAb, flat transparent; 80IAc, spherical but not very solid; 80IAd, with single pit and spine are cut as types)
- e. ephemeral, transparent (when viewed overlapping another phytolith), perfect spheres with very smooth edges/surfaces. Widespread in comparative specimens, varying greatly in size. Possibly not silica. Not diagnostic.

80IB. rugulose (rugose) surface

- a. small (< 10 microns) (woody dicots, with some overlap with *Canna*, Marantaceae)
- b. large (10-30 microns) (Marantaceae, Cannaceae mixed type)

80IC. Nodular surface

- a. projections are short, small diameter, round at base; arrangement of projections is irregular; overall shape is spherical to elliptical or irregular in outline
 1. small (< 20 microns; original type) (Marantaceae and Bombacaceae mixed type)
 2. large (20 microns or larger); short projections have large basal diameters (Zingiberaceae, *Costus scaber* diagnostic level under review)
- (80ICb, projections large with large basal diameter, is cut as a type)
- c. spheres with nodules that may have runcate (formerly serrate) or smooth surfaces; projections have obtuse tips, sides uneven; projections are arranged regularly to spirally ranked and large; sphere may have a dark center; whole surface is composed of projections (Zingiberaceae and Bombacaceae mixed type)
 - d. rough spheres to irregular flattened bodies with nodules, occasional spinules, and linear ridges (Marantaceae, *Maranta*, *Calathea* diagnostic) ADD TO DATABASE

(80ICe, hollow sphere, moved to 90IICa)

- f. irregularly shaped sphere, surface has nodules and cilia (Zingiberaceae, *Costus*, diagnostic level under study)

80ID. spinulose surface (= or > 6 μ indicates Arecaceae diagnostic, = or < 5μ indicates Bromeliad)

80IE. irregularly angled/folded surface

- a. original 80IE (Zingiberales diagnostic)
- b. angled/folded with nodules; size tends to be 20 microns or larger. (PC2596 *Calathea allouia* leaf; diagnostic level under study; compare to 80ICd)

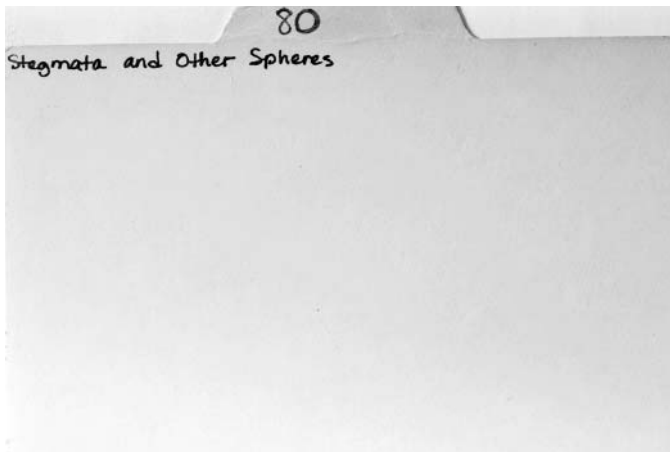
80IF. faceted/scalloped

- a. small*
- b. large
 1. spheroidal (Cucurbitaceae spheres)
 00. elongated facets (Cucurbitaceae, *Lagenaria siceraria*, species level diagnostic)

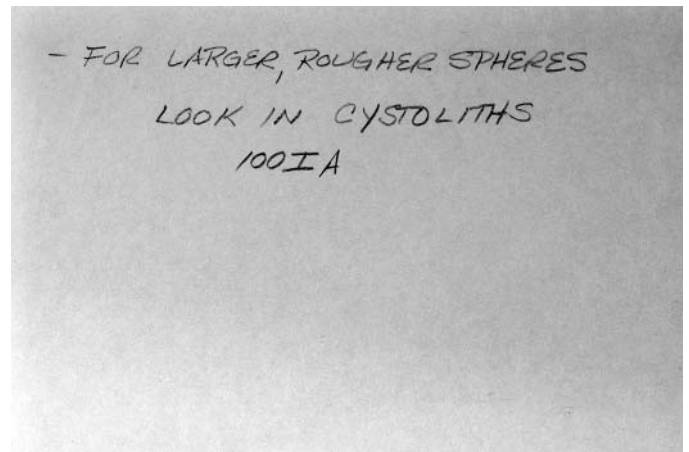
- 01. roundish facets
 - A. broken examples, identifiable to family, only
 - B. faceted spheres with clear demarcation of 2 hemispheres; profile domed/round, not conical (*Curcubita* spp.)
 - a. smaller, highly silicified (diagnostic level: *Curcubita*, wild)
 - b. larger, more lightly silicified (diagnostic level: *Curcubita*, domesticated)
 - c. very large with barely scalloped smaller hemisphere (*C. ficifolia*, species level diagnostic)
 - C. faceted sphere with smaller hemisphere that is conical in profile (*Sicana odorifera*, species level diagnostic)
- 02. faceted sphere, Cucurbitae tribe
- 2. hemispherical/elliptical
 - 00. regular scallops, tall in side view (Burseraceae, *Trattinnickia glaziovii*, family level diagnostic)
 - 01. central vertical plane edges scalloped (Ebenaceae, *Diospyros meloninii*, family level diagnostic)
 - 02. irregular concavities, hemisphere has stippled surface (Bombacaceae, *Pachira*, *Matisia*, *Pseudobombax*, family level diagnostic)
- 3. irregular in shape (Annonaceae, *Annona muricata*, family level diagnostic)
- 80IG. Dimpled surface
- 80IH. large; with sharp projections or lobes (not faceted)
- 80II. Porous to ciliate surface, spheroidal to slightly flattened with circular outline; size variable; may have denser core. (Marantaceae, *Donax*, *Thalia*; wild Marantaceae diagnostic)
- 80IJ. verrucose surface (Marantaceae, *Calathea allouia*, genus level diagnostic, tuber).
- 80IK. Acute, curved, pointed projections
 - a. large, few projections; large sphere with globule-like outer ring (range is 15-40 μ but most are 25-30 μ in range) (Zingiberaceae, *Costus guanaiensis* rhizome; diagnostic level under study) (old 80IEb)
 - b. small, abundant projections; smaller sphere (Range 7.5-25 μ , most common 10-20 μ) (Marantaceae, *Calathea*; diagnostic level under study)

80II. troughed bodies

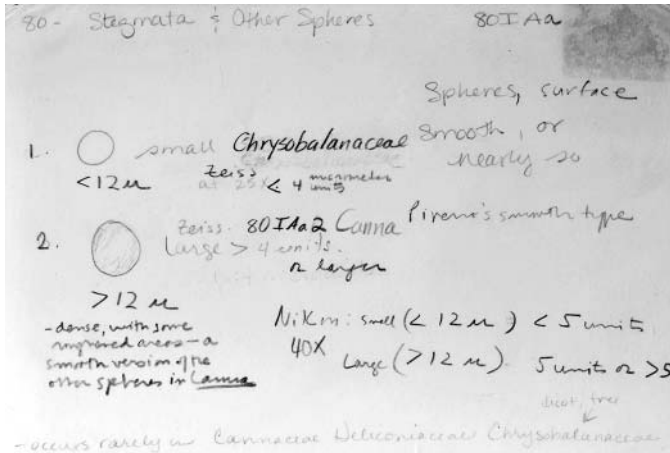
- 80IIA. roughly elliptical and elongated (*Heliconia* genus level diagnostic)
 - a. trough ends acute; smooth edges
 - b. trough ends acute; projections on edges
 - c. trough ends blunt; projections on edges
- 80IIB. squared or rounded, not elongated
 - a. thick, blocky (old 80IIB: *Musa* genus level diagnostic)
 - b. verrucose with undulating edge, multi-outlined pit; observed in seed, fruit, and root cortex; not diagnostic
- 80III. conical (hat-shaped) bodies
 - 80IIIA. spheroidal in rotation; 1-5 projections visible on top, bottom smooth (Arecaceae family level diagnostic)
 - 80IIIB. conical in rotation; bottom is rugulose or short nodular (Marantaceae family level diagnostic)
 - 80IIIC. large domed conical body, 20 microns in diameter, 10 microns tall (Zingiberaceae, 2744 *Costus scaber*, diagnostic level under study)
 - 80IIID. conical body with ciliate projections (Marantaceae; 2740 *Thalia geniculata* root, diagnostic level under study)
- 80IV hemisphere, not faceted. Surface smooth (Cyatheaceae, *Cyathea pallescens*; diagnostic level under study)



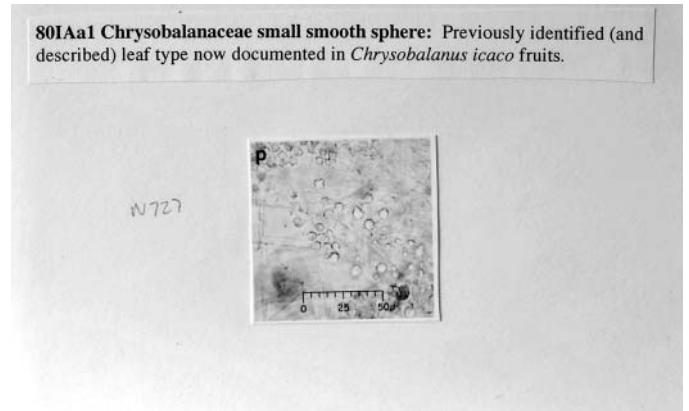
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80 card 2.JPG

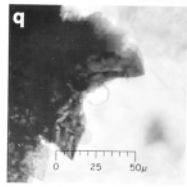


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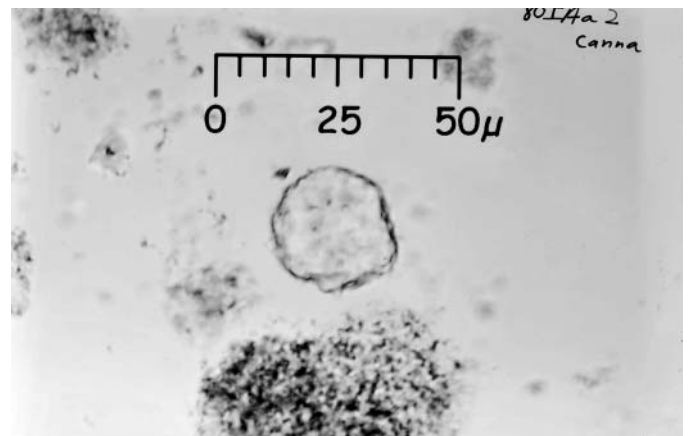


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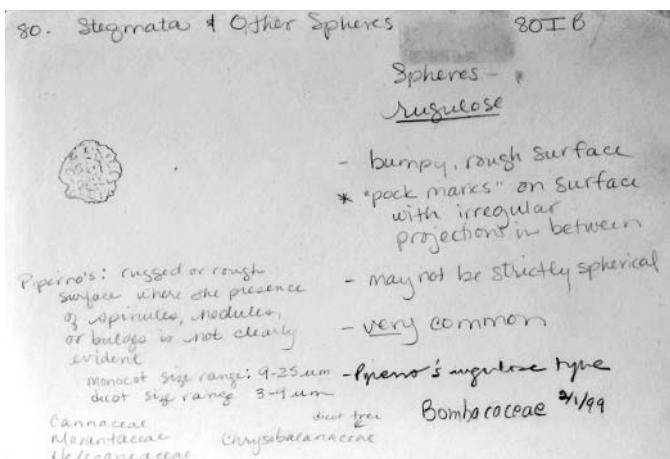
80IAa2 *Canna* large smooth sphere: Previously observed in *Canna edulis* leaves (Pearsall and Dinan 1992; Pearsall 2000) and *C. jaegeriana* fruit, the type also occurs in the *C. edulis* tuber epidermis. Solid silica spheres with smooth surfaces, diameter > 12 microns; some have a raised collar or indentation. Not observed in other genera tested for this project or in prior research. A number of plants produce lightly silicified, spherical to spheroidal phytoliths; the larger, highly silicified *Canna* type is easily distinguished from these.



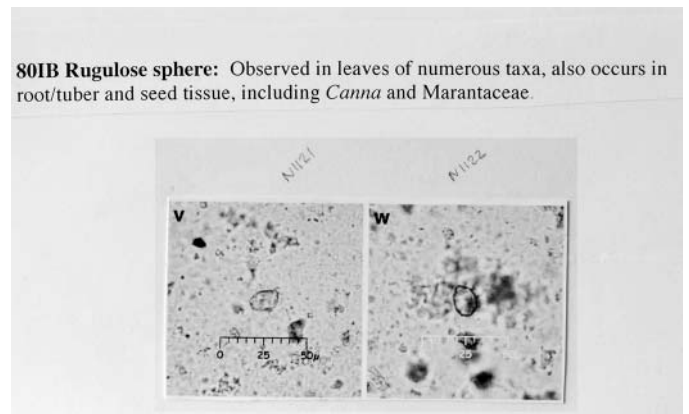
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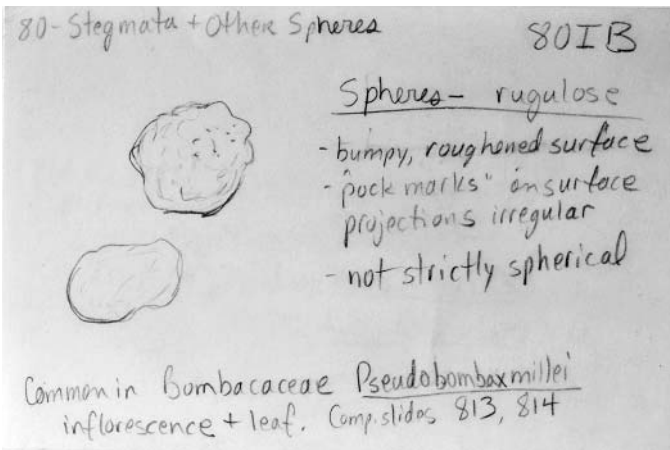
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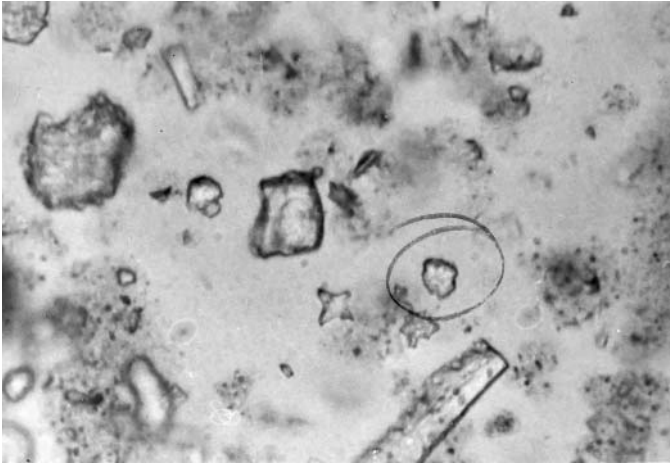
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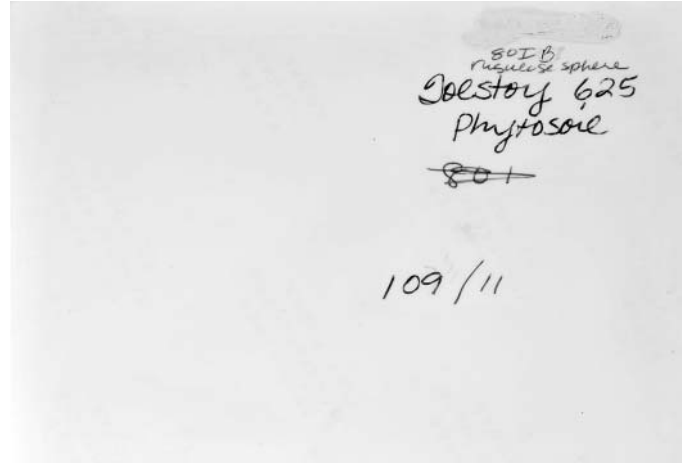
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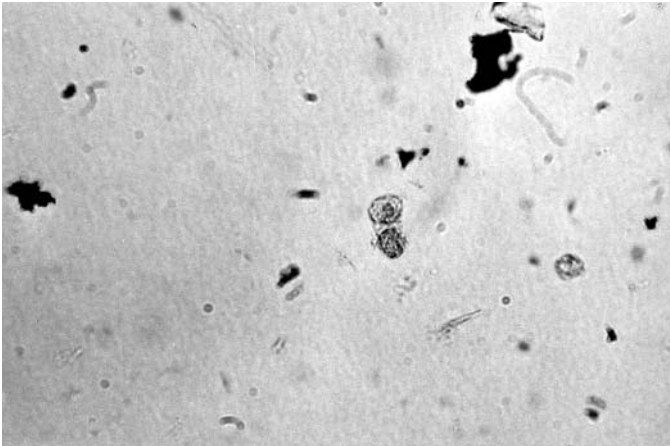
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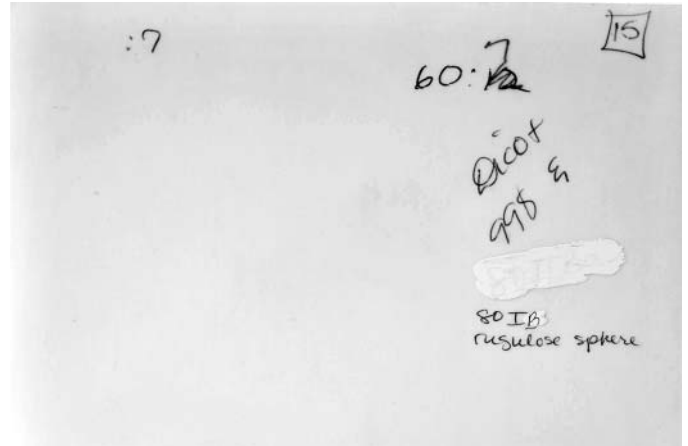
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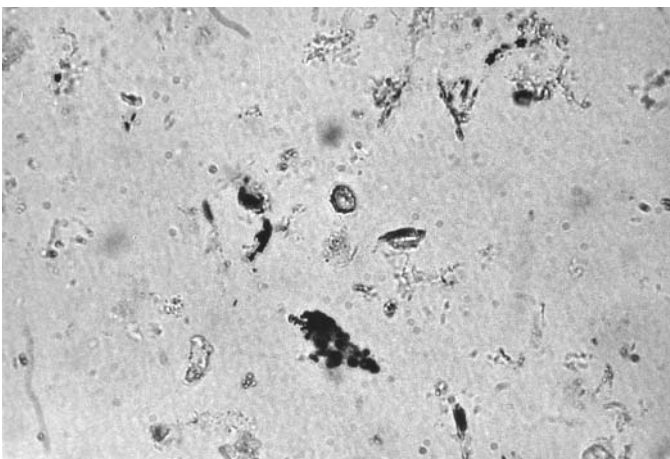
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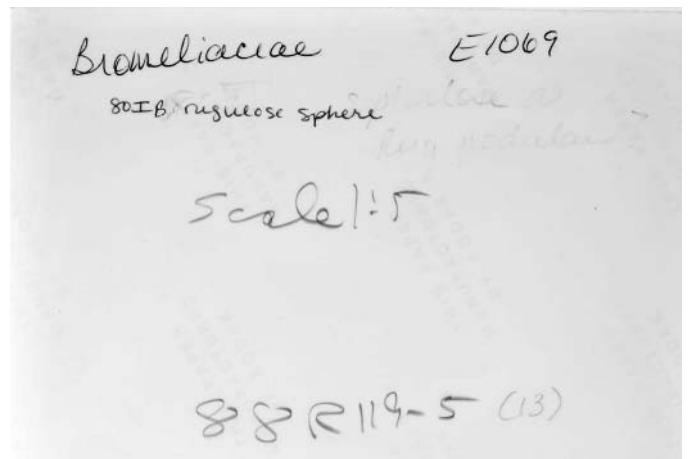
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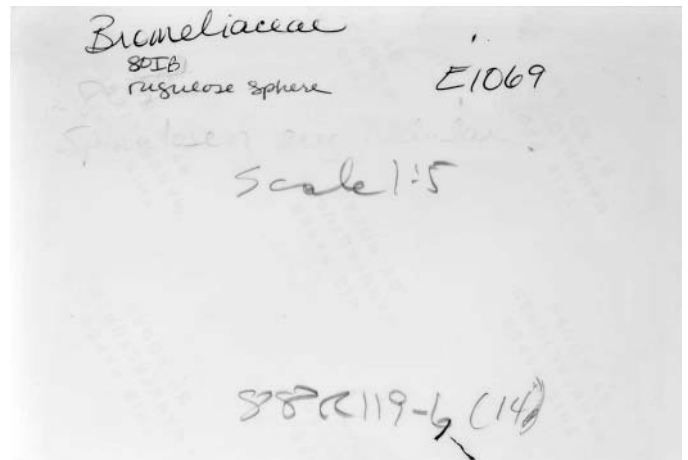
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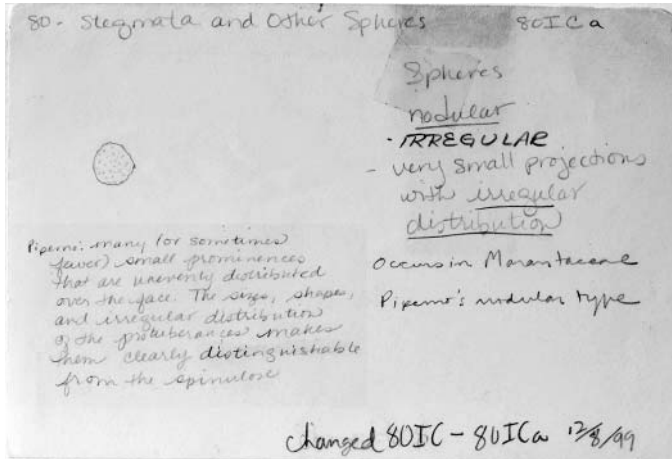
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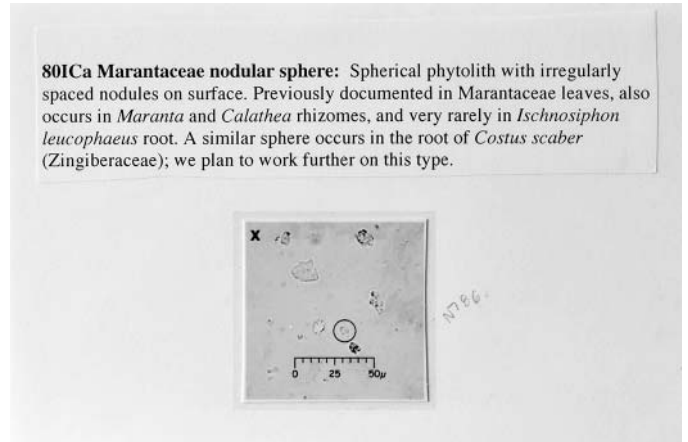
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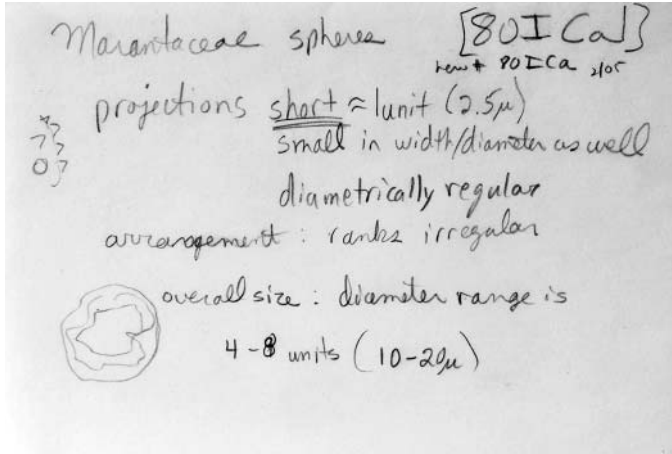
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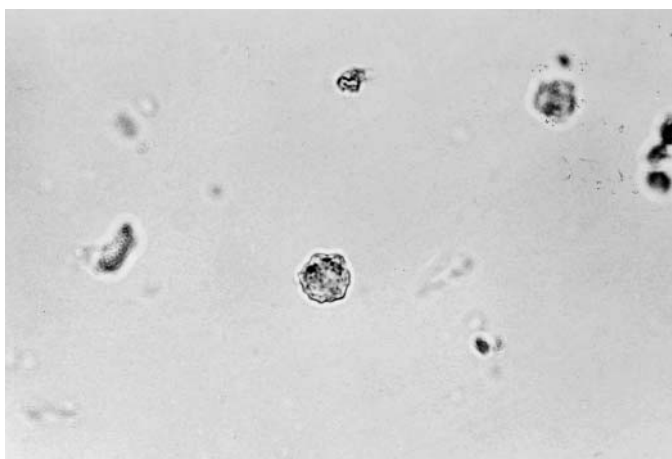
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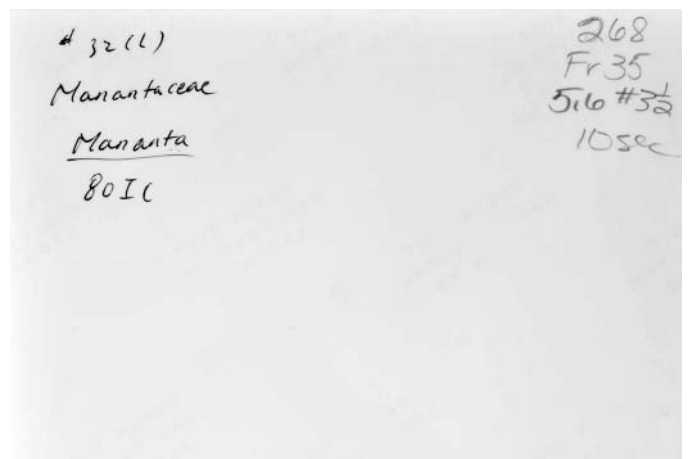
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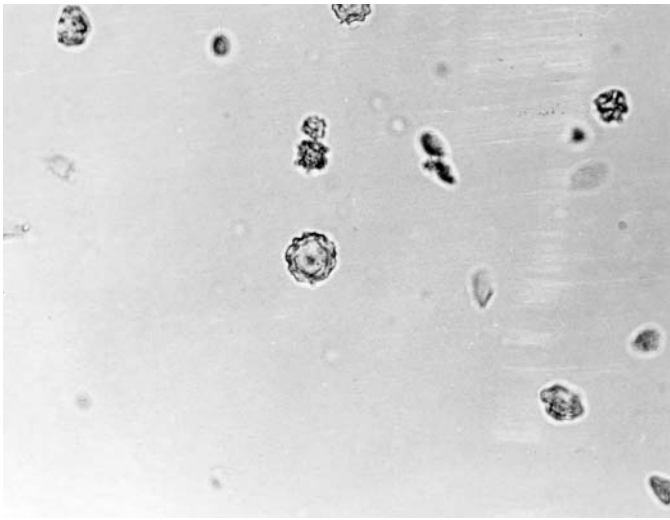
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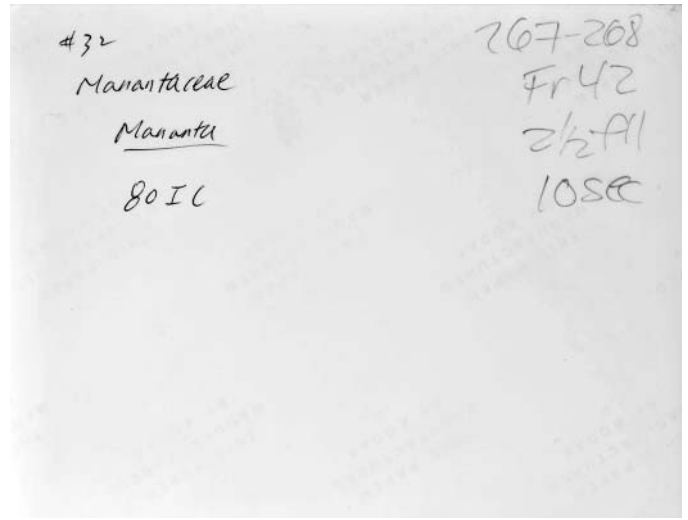
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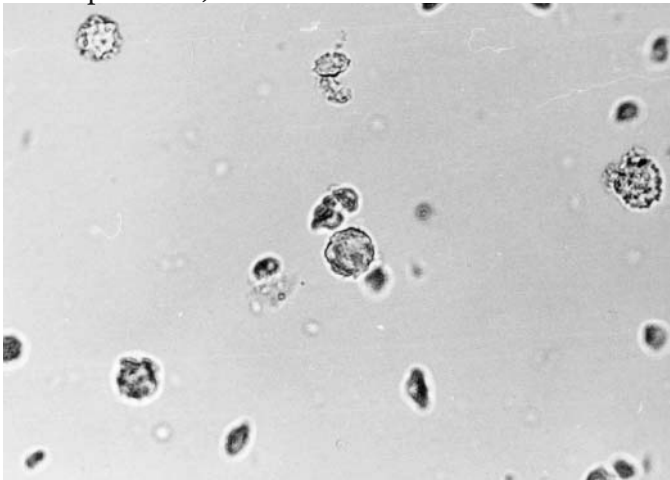
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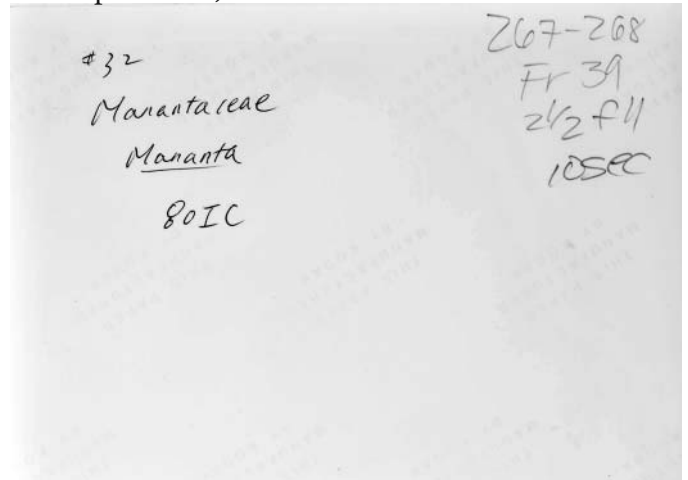
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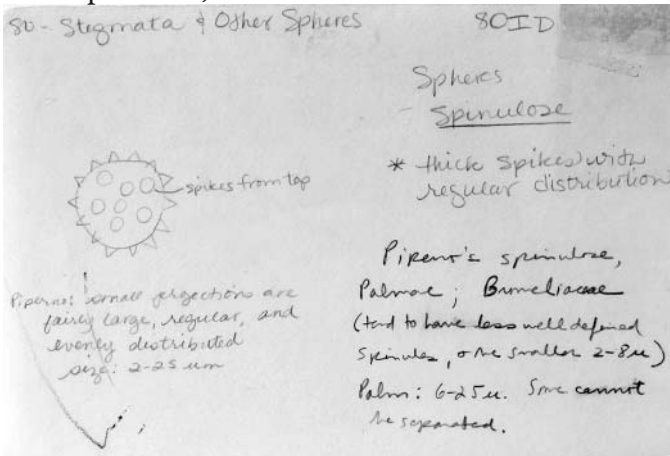
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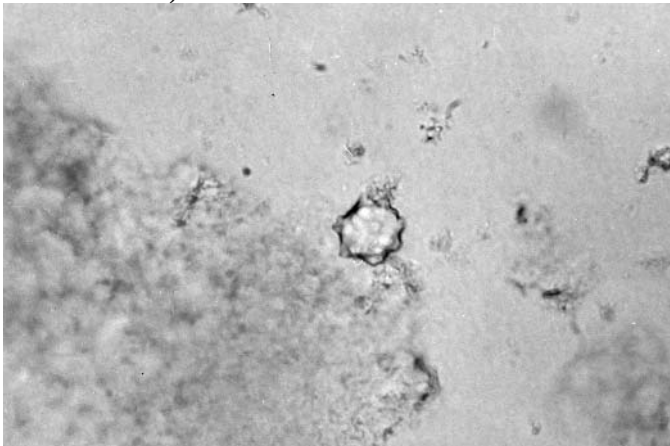
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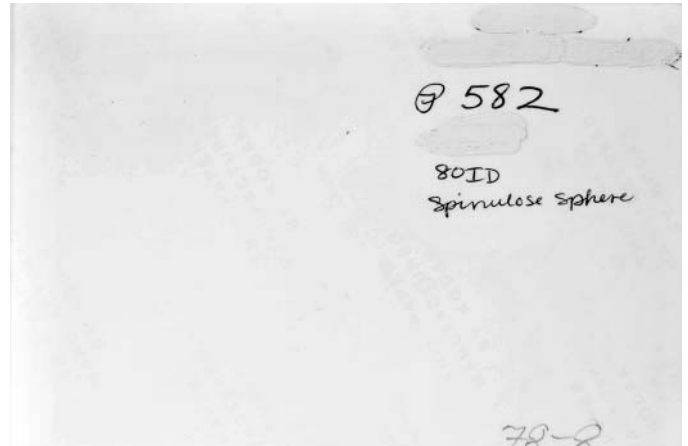
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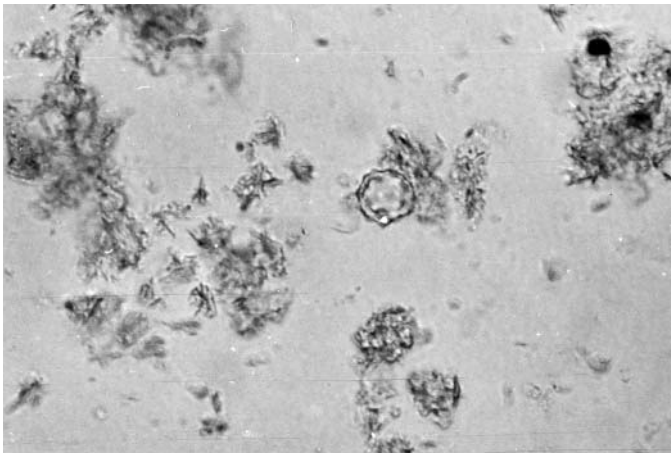
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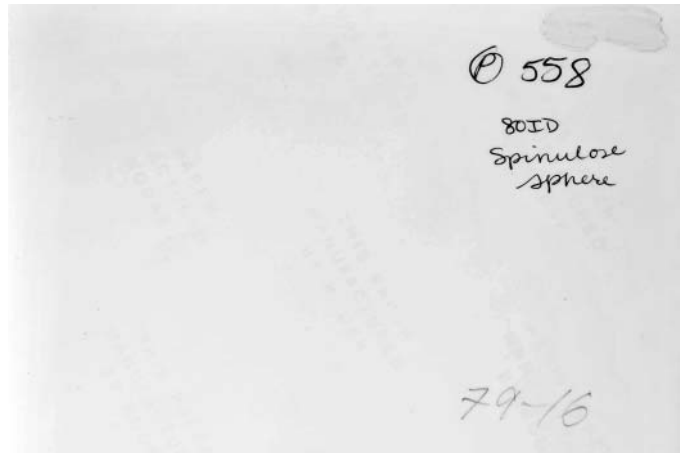
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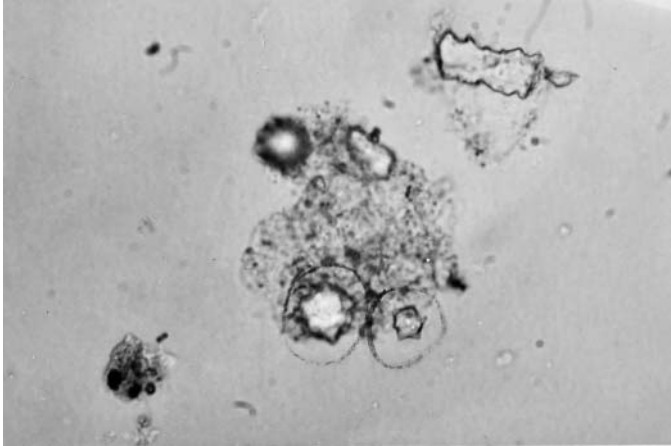
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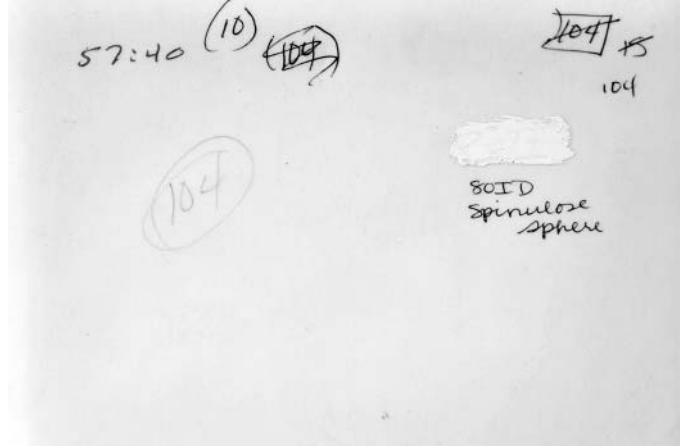
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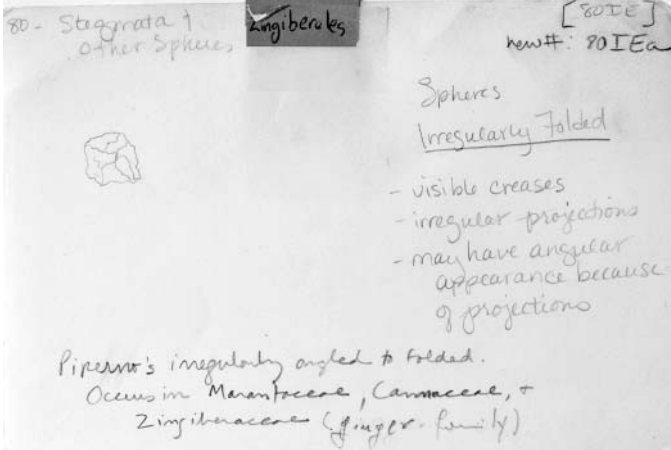
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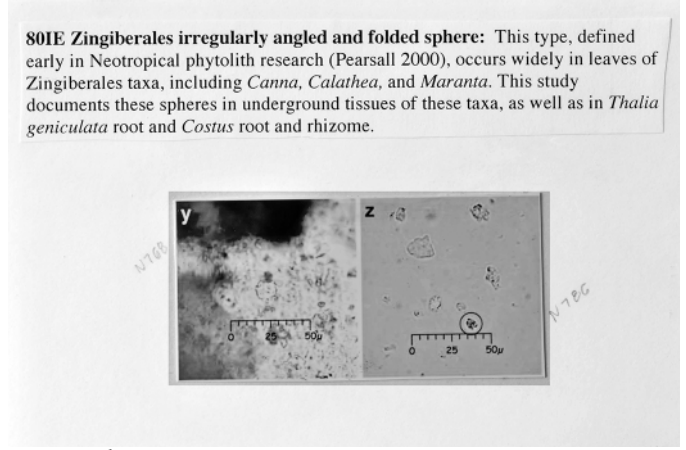
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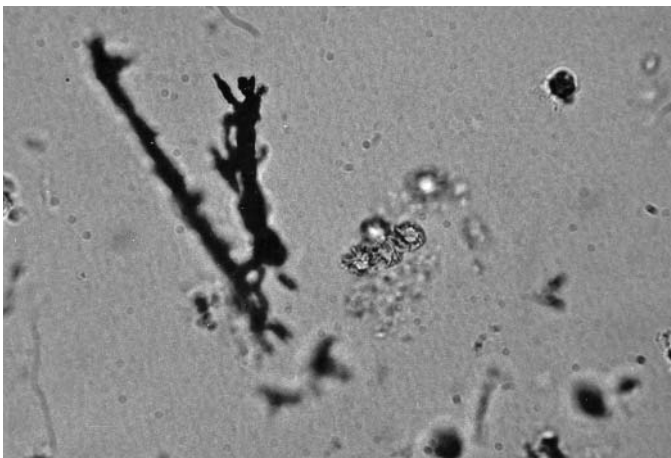
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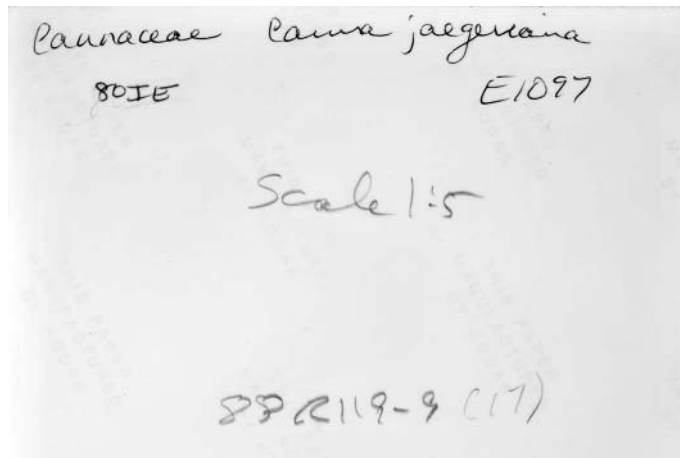
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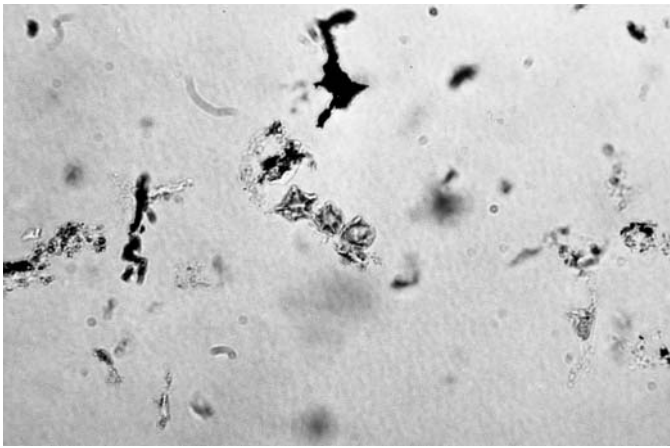
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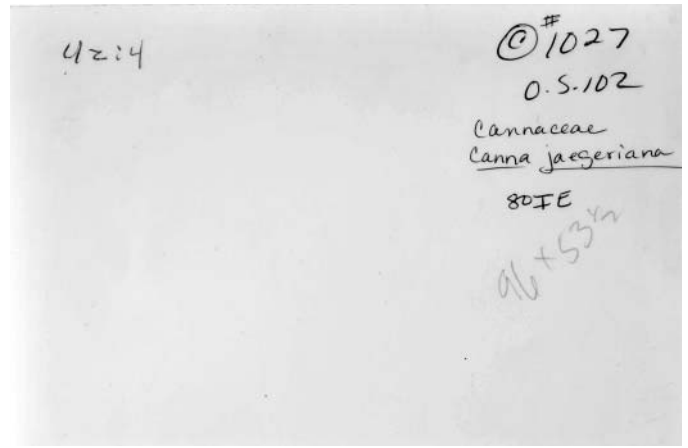
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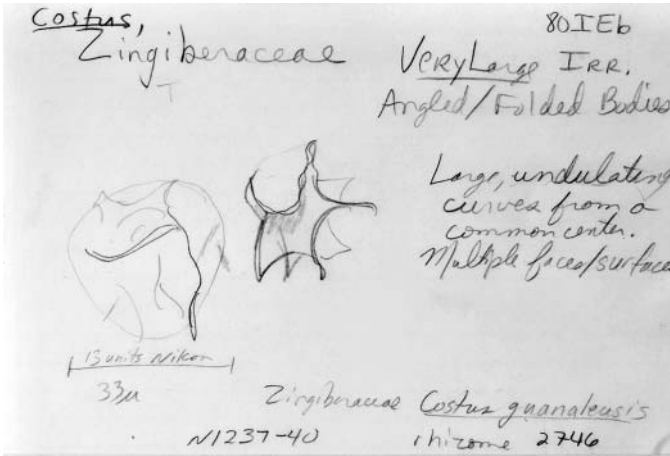
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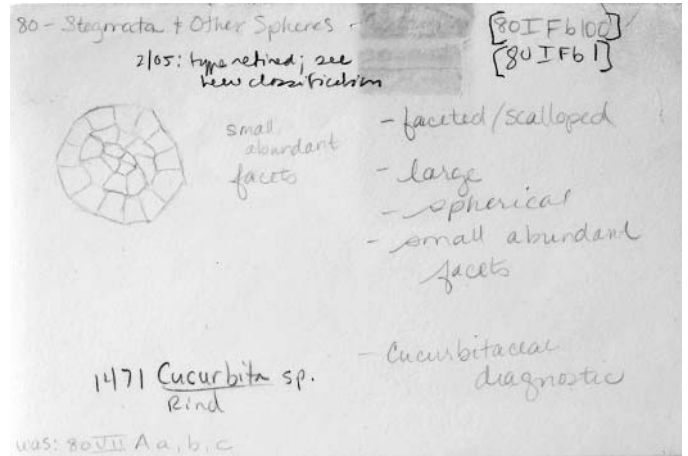
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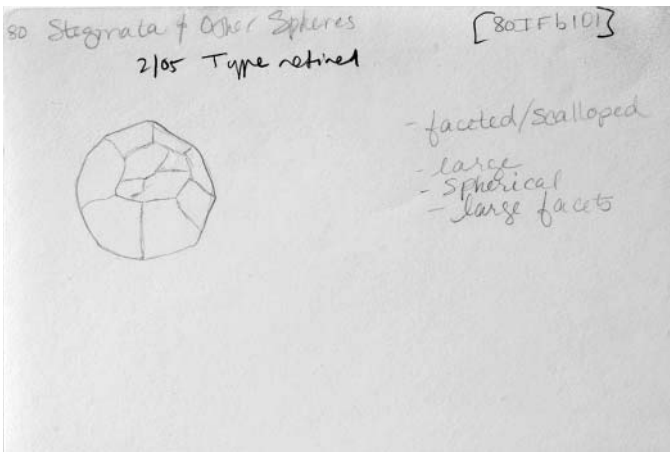
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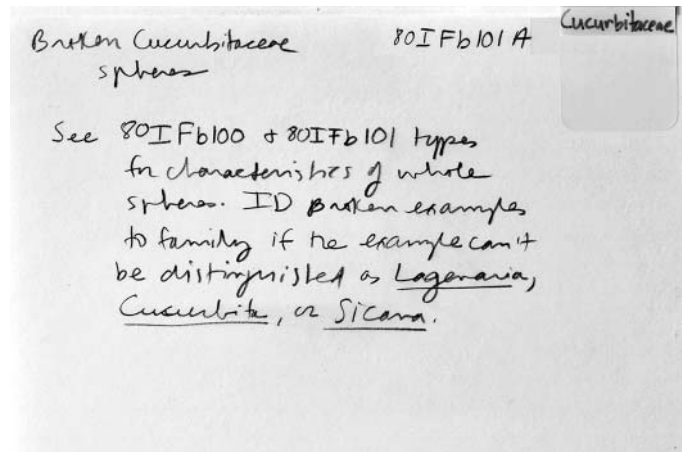
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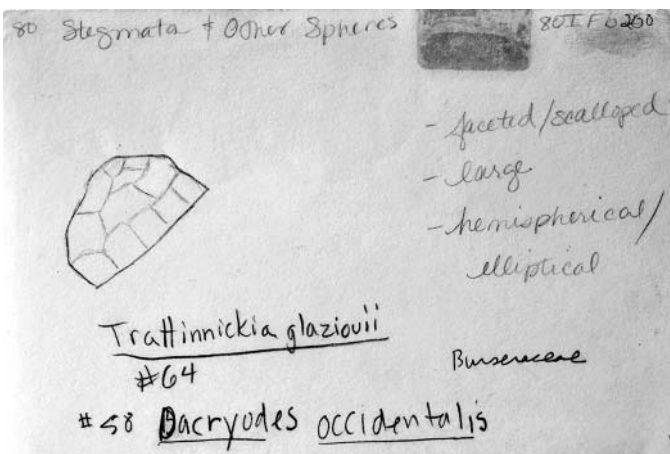
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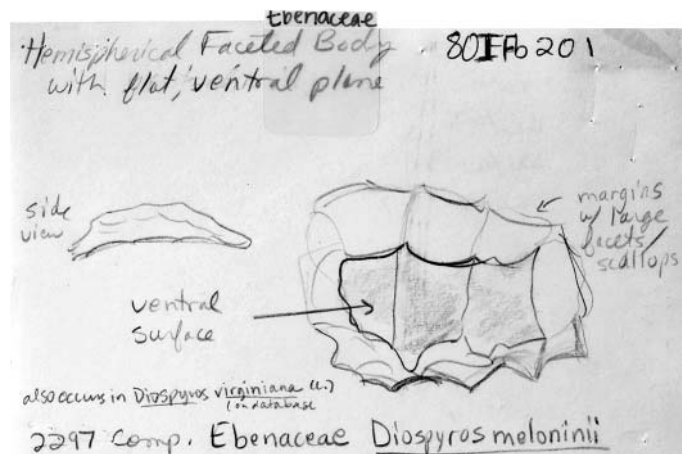
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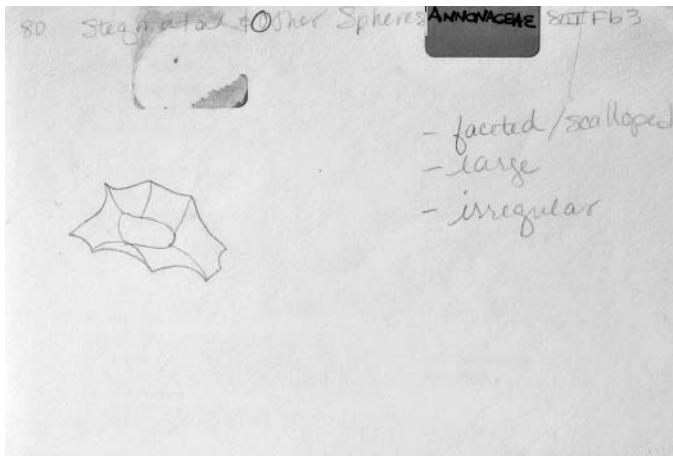
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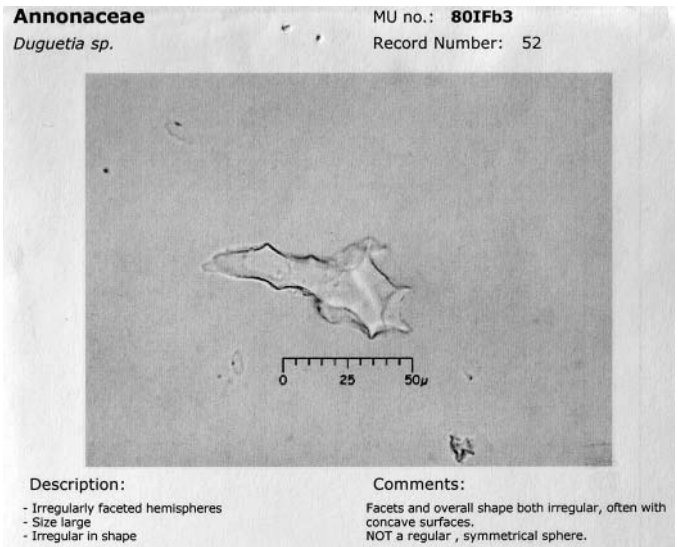
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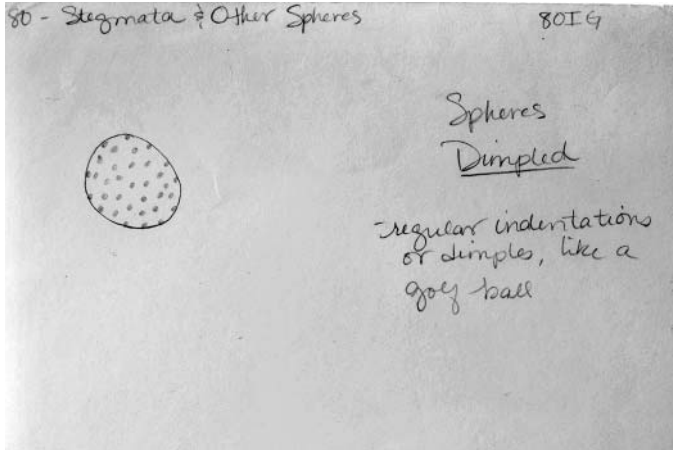
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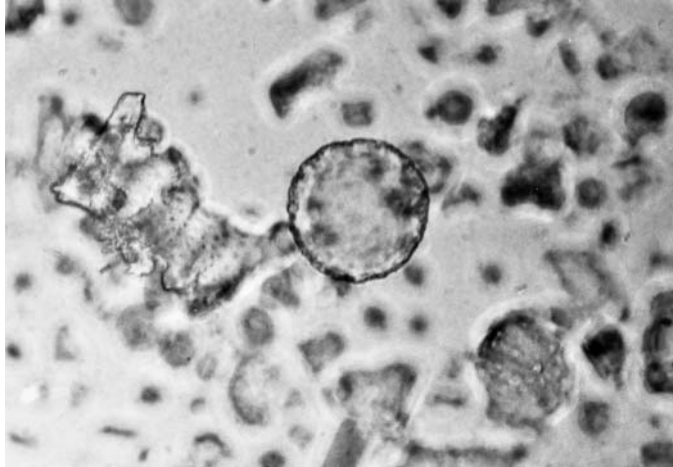
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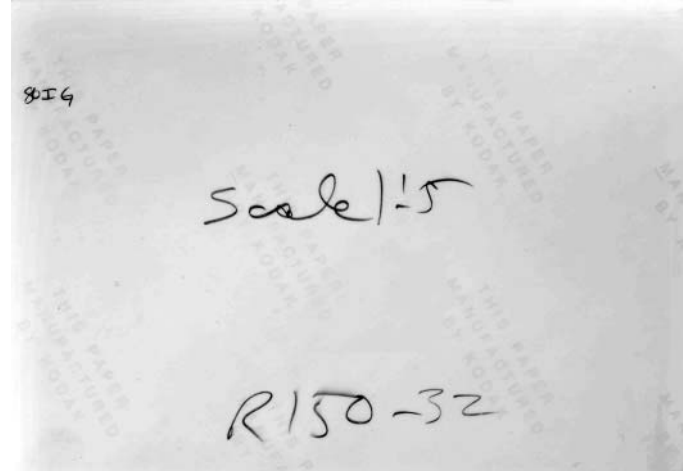
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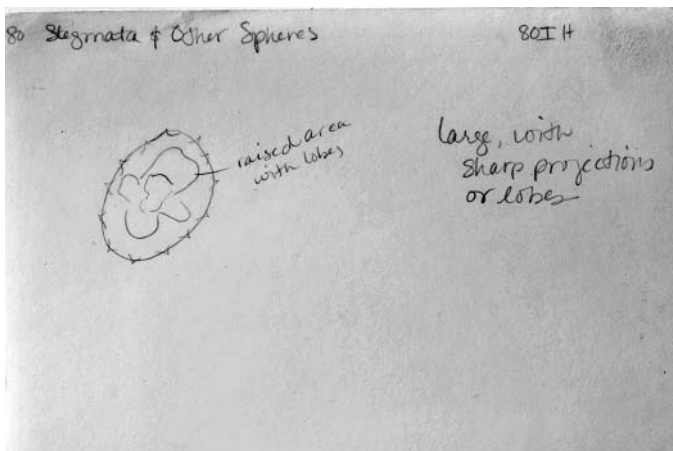
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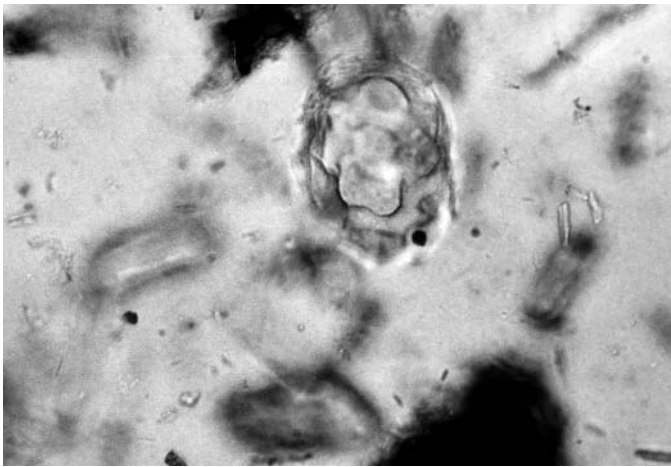
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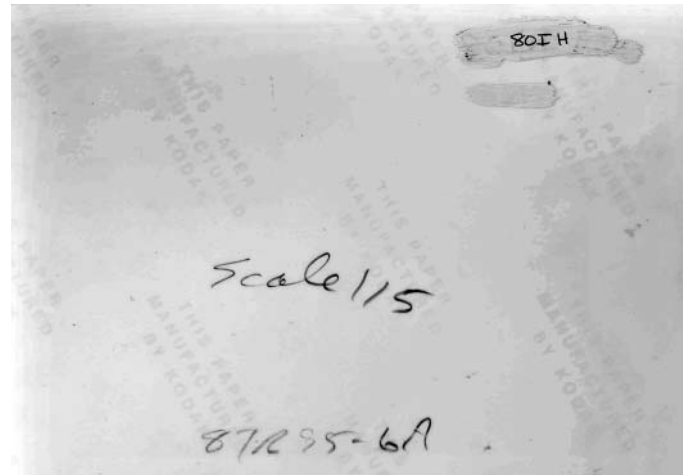
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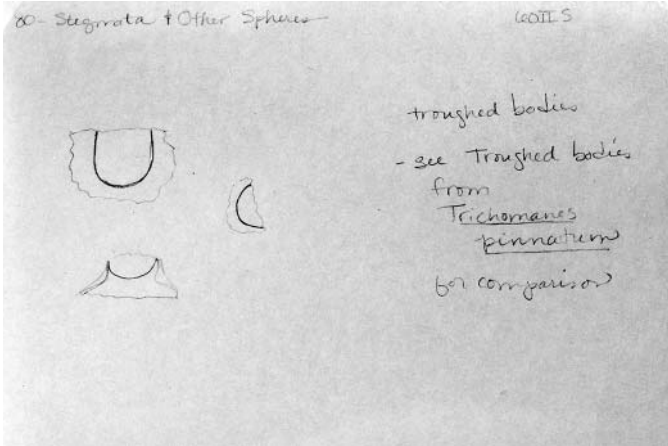


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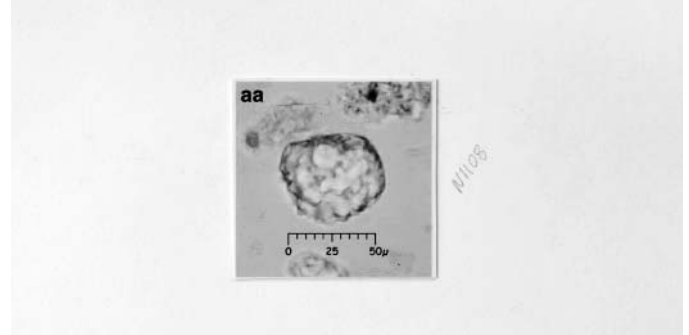


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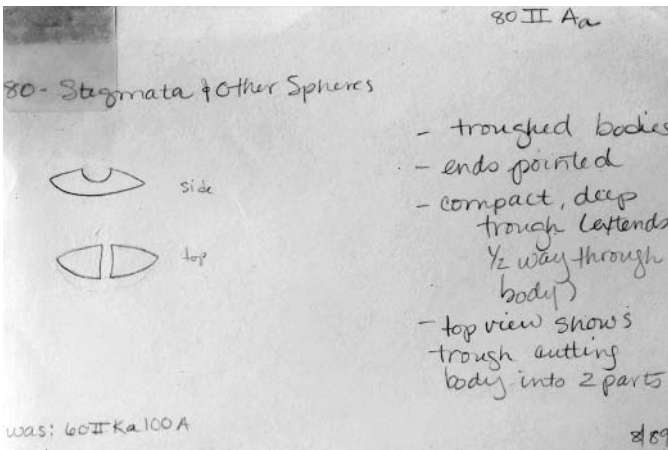
80IJ *Calathea verrucata* sphere: Spherical to spheroidal bodies, up to 50 microns in diameter, with dense verrucate decoration (irregularly shaped projections).



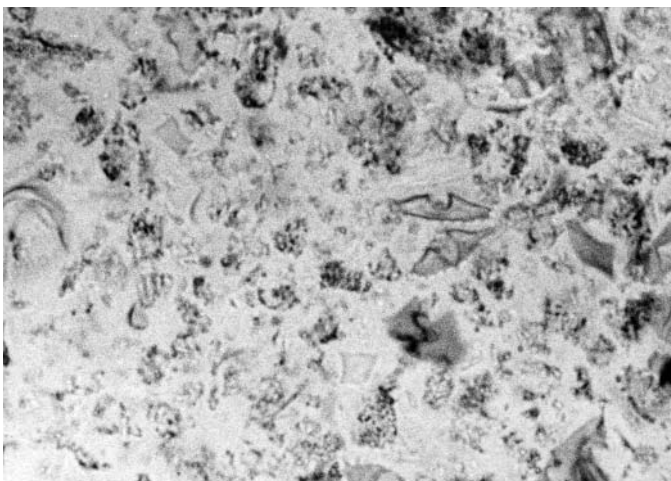
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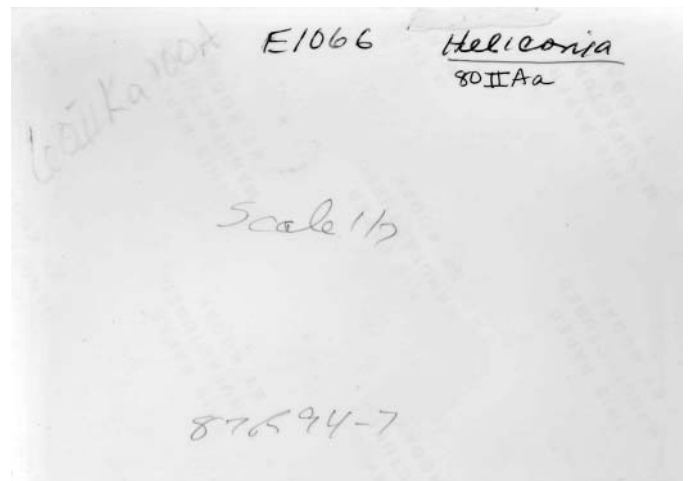
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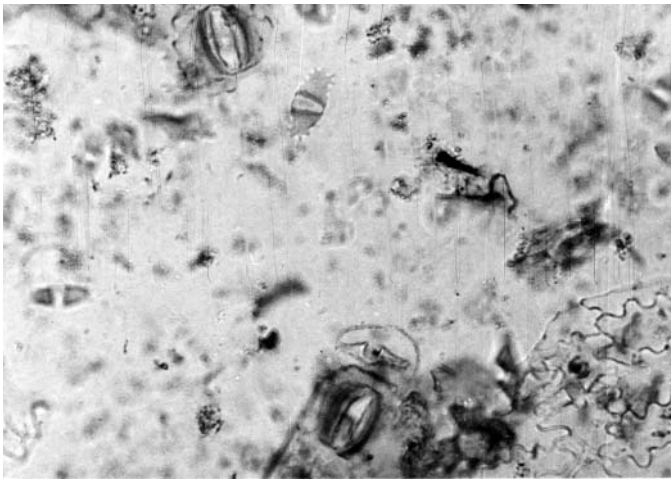
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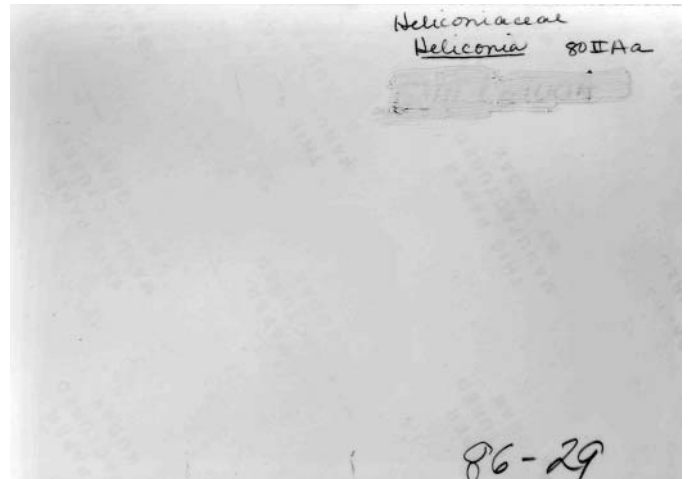
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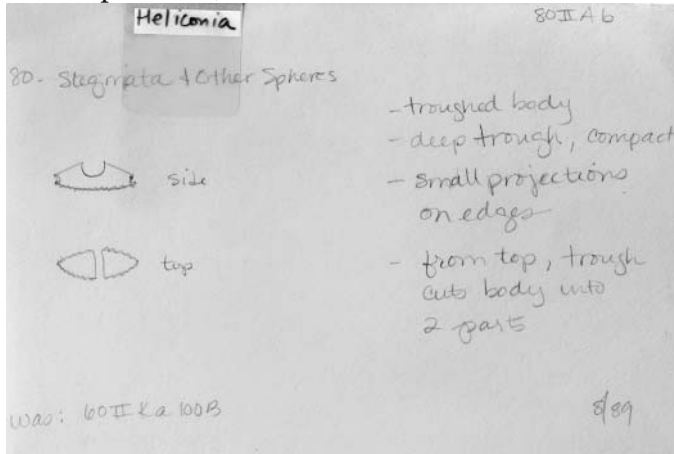
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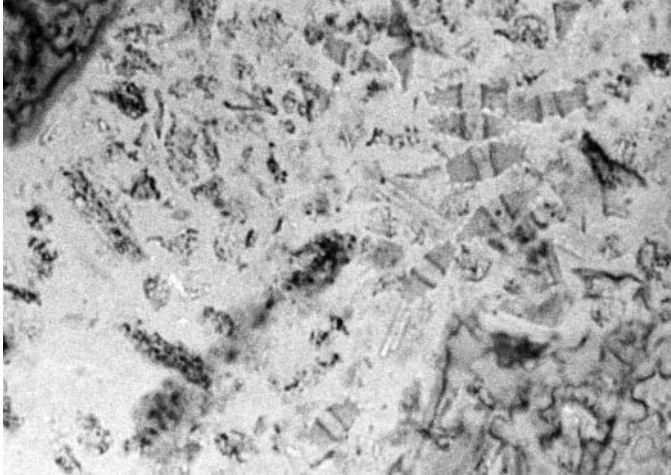
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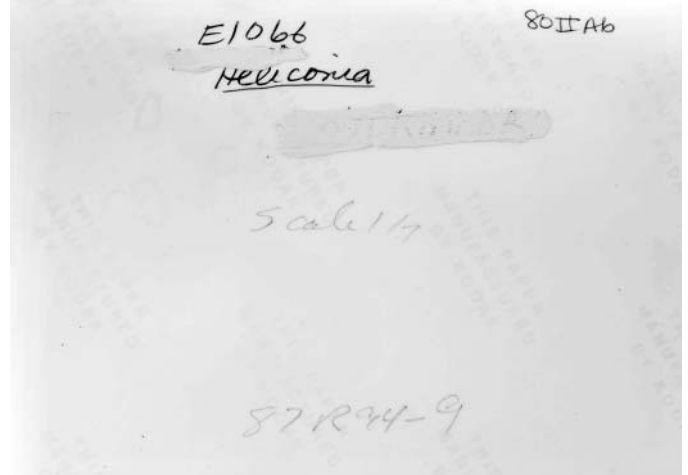
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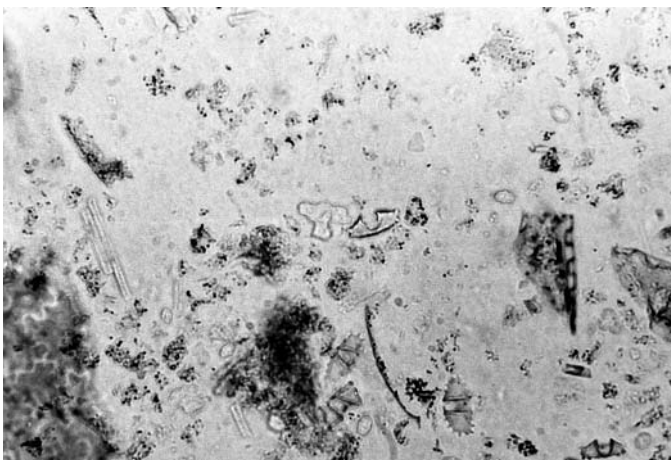
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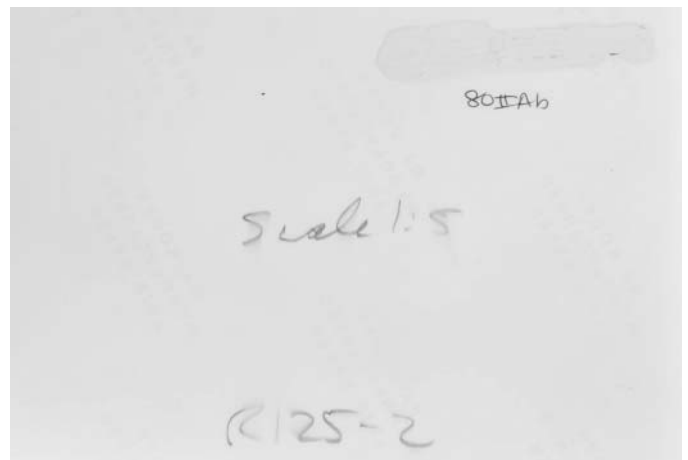
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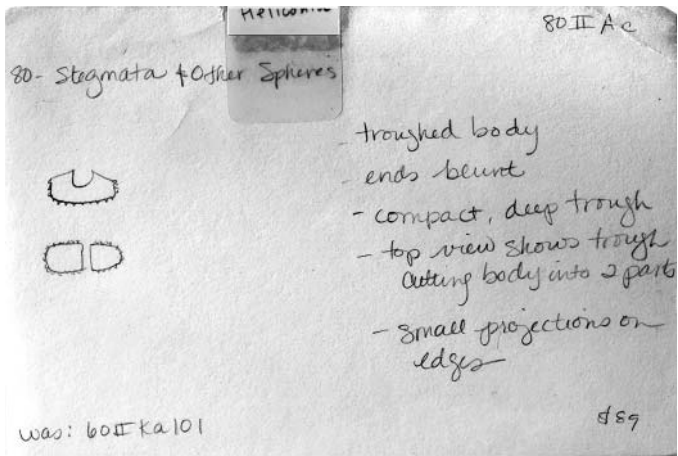
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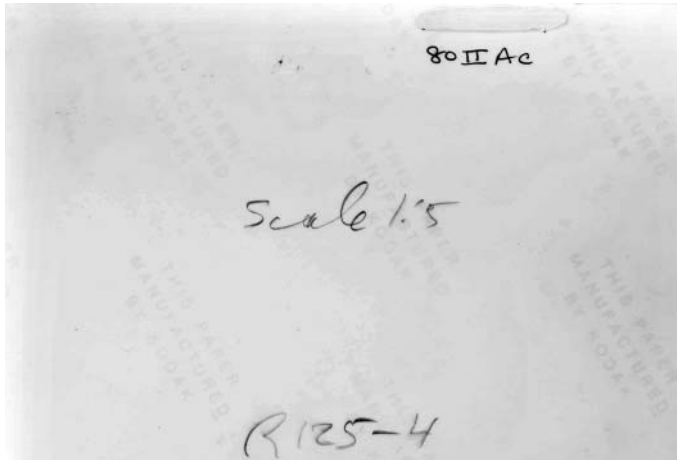
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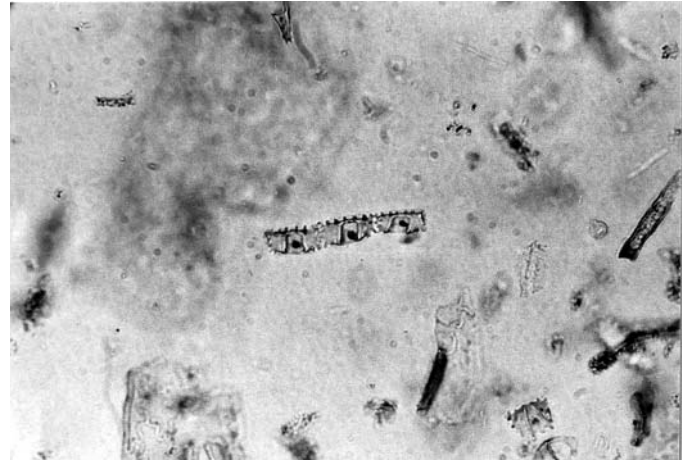
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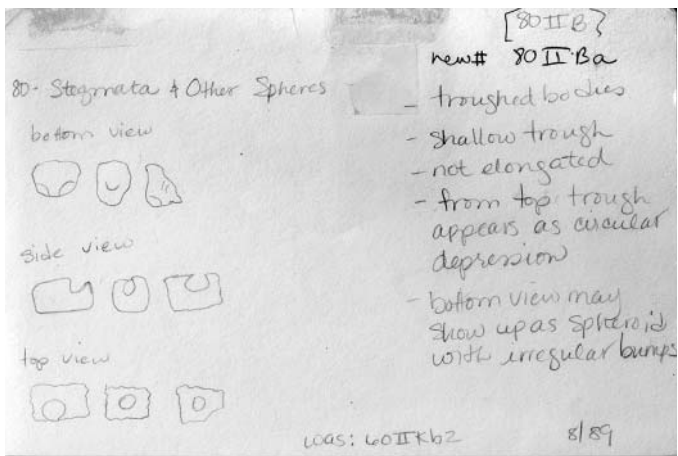
80IIAc card 1.JPG



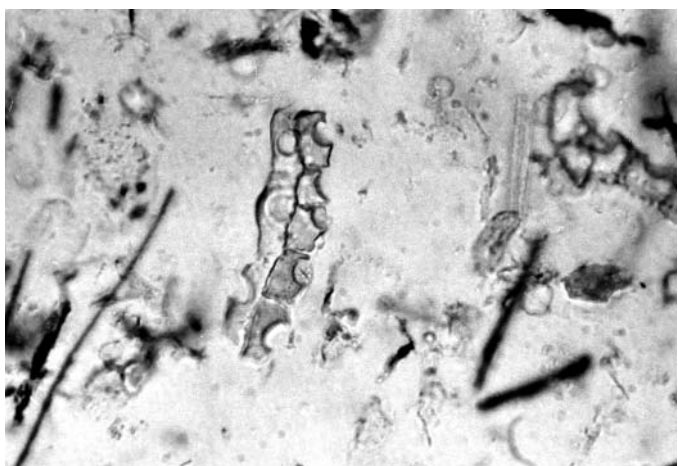
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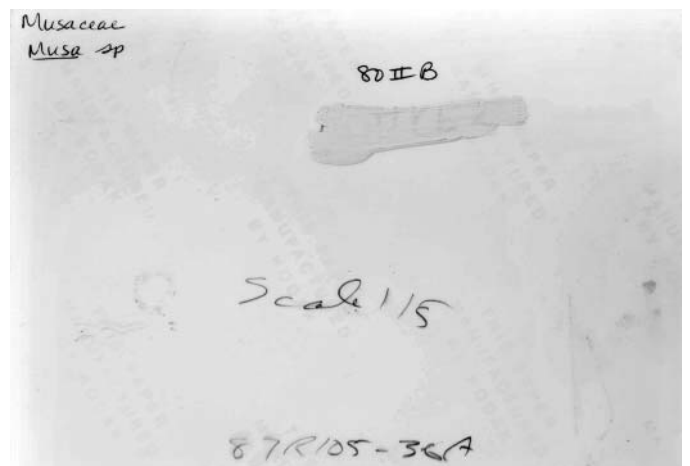
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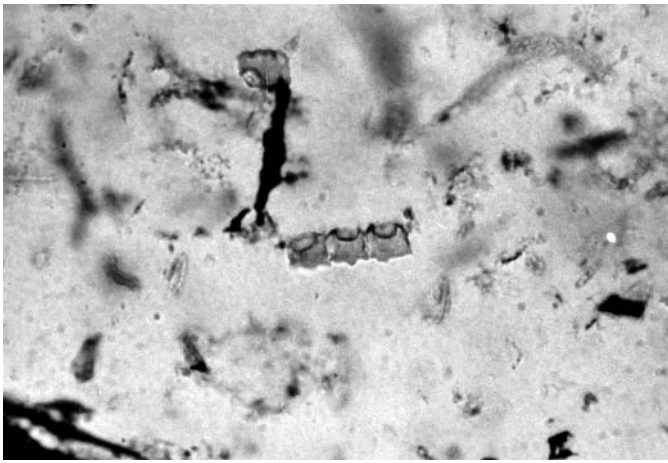
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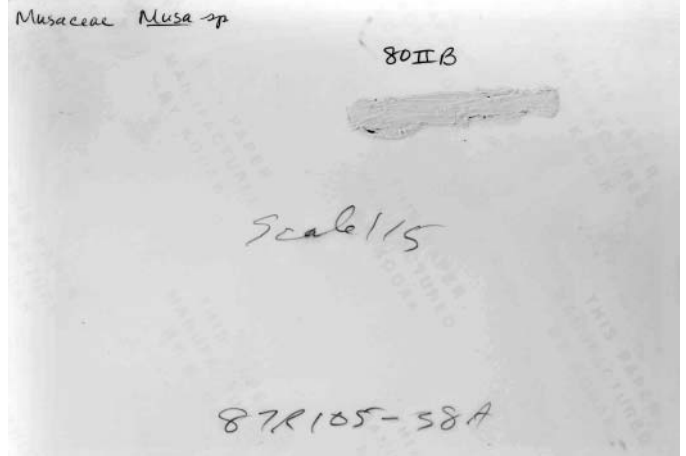
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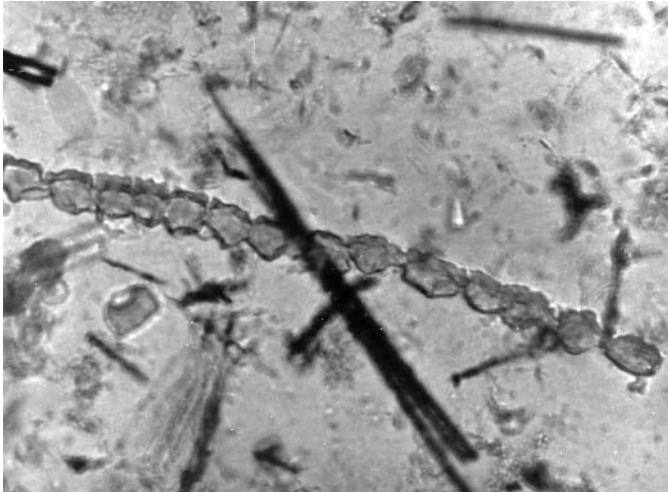
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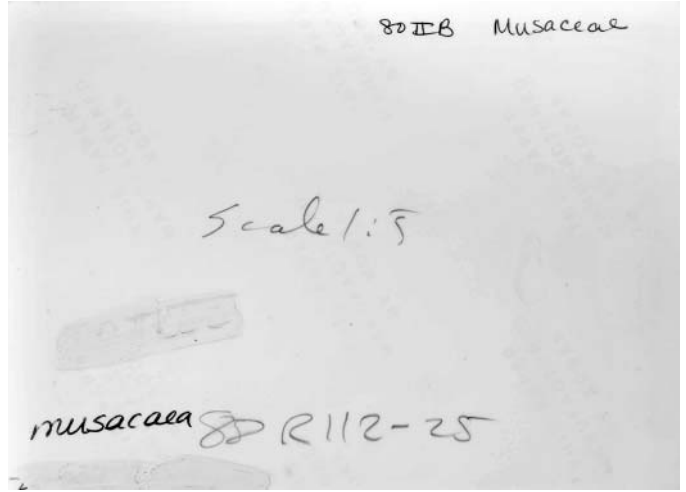
80IIBa photo 2f.JPG



80IIBa photo 2b.JPG

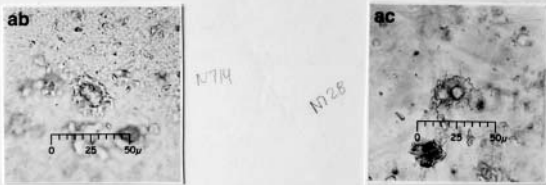


80IIBa photo 3f.JPG

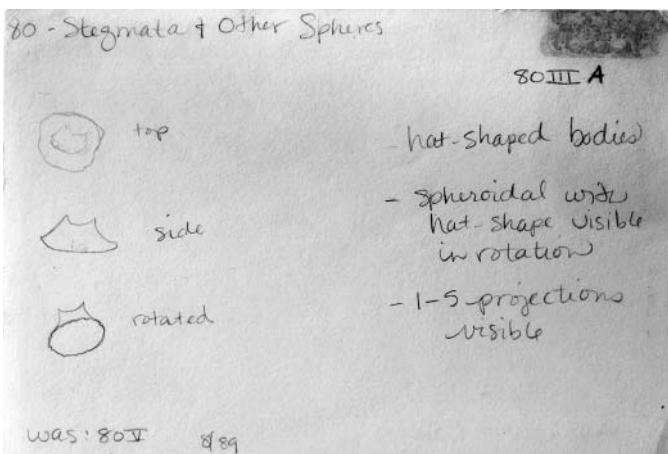


80IIBa photo 3b.JPG

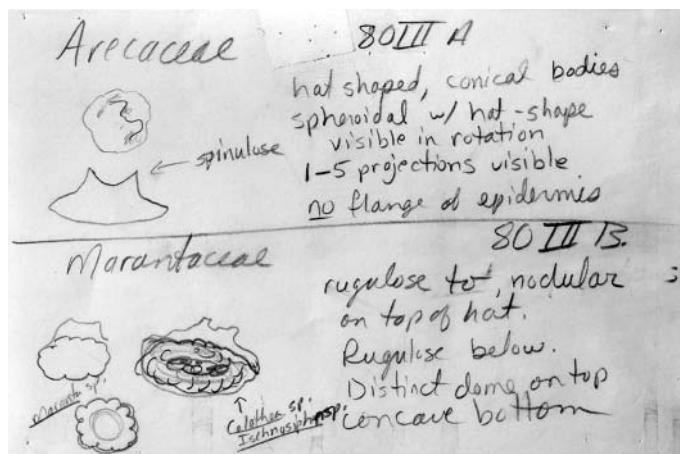
80IIBb Verrucate trough body: Decorated, textured verrucate platform with a multi-outlined pit in the center of one side. Seeds, fruit, and root cortex.



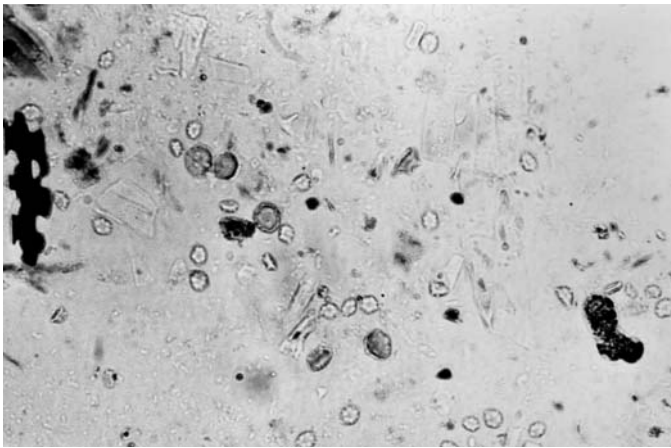
80IIBb photo 1f.JPG



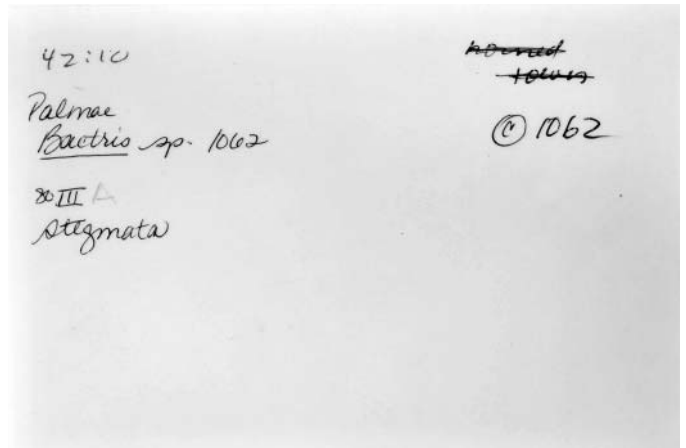
80IIIA card 1.JPG



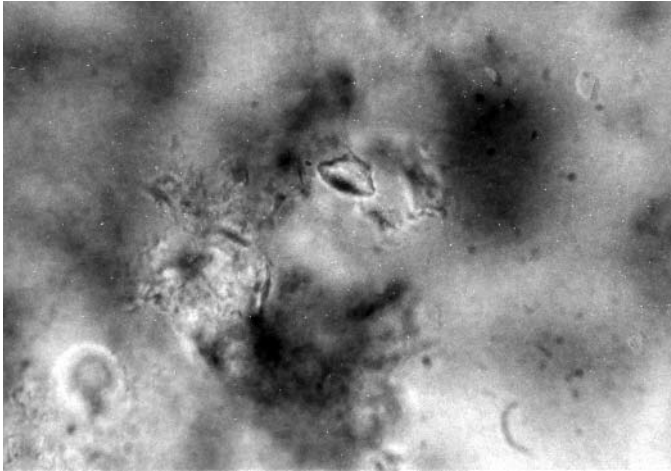
80IIIA card 2.JPG



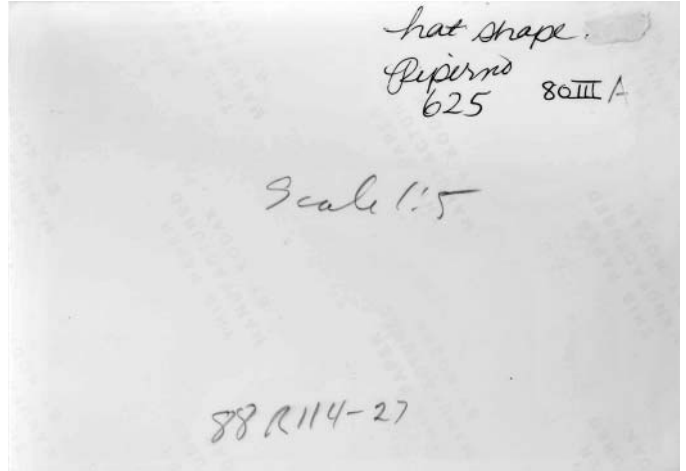
80IIIA photo 1f.JPG



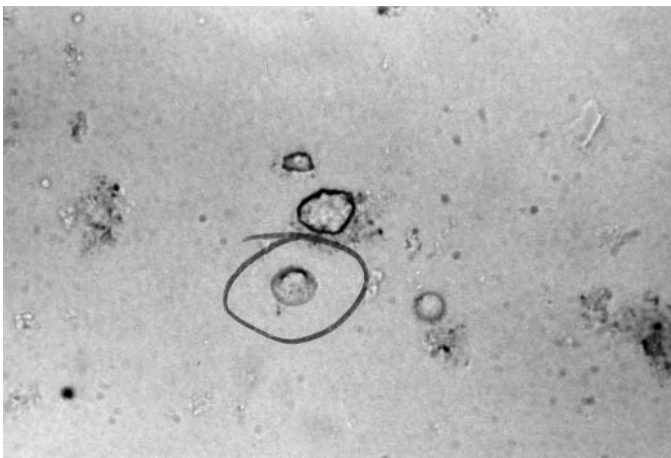
80IIIA photo 1b.JPG



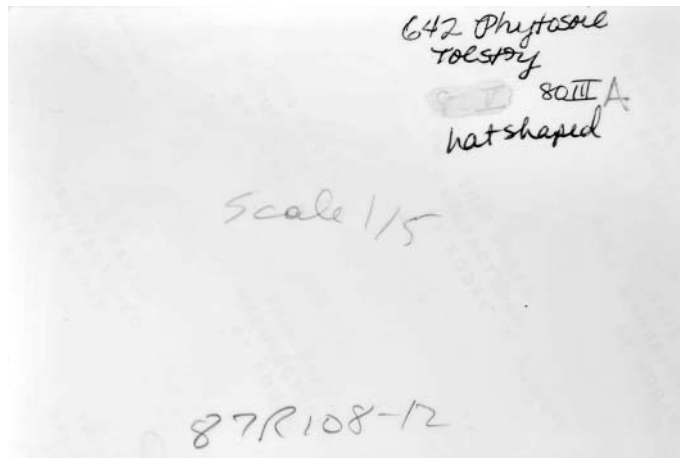
80IIIA photo 2f.JPG



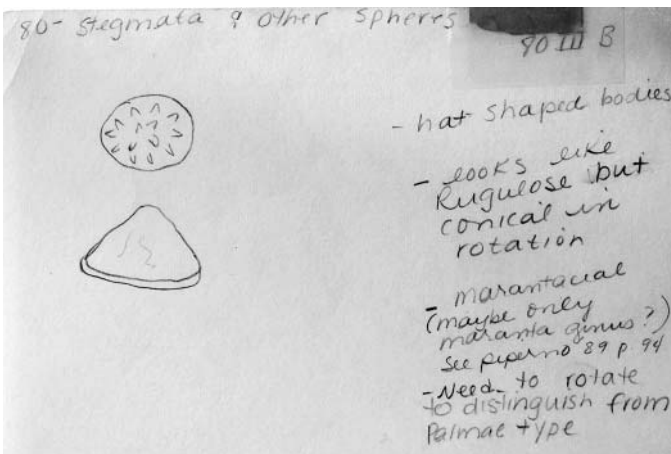
80IIIA photo 2b.JPG



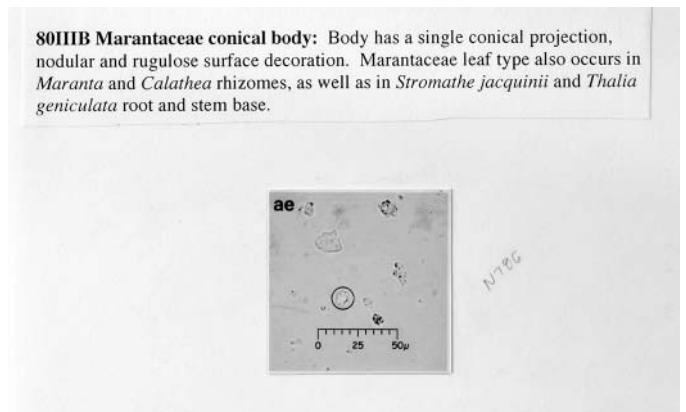
80IIIA photo 3f.JPG



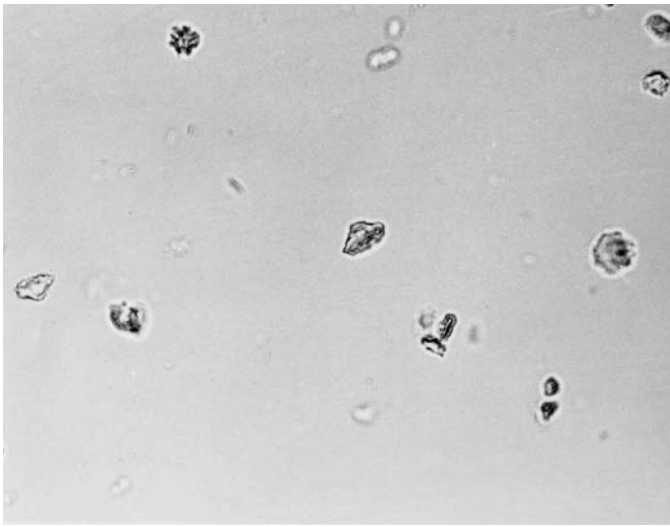
80IIIA photo 3b.JPG



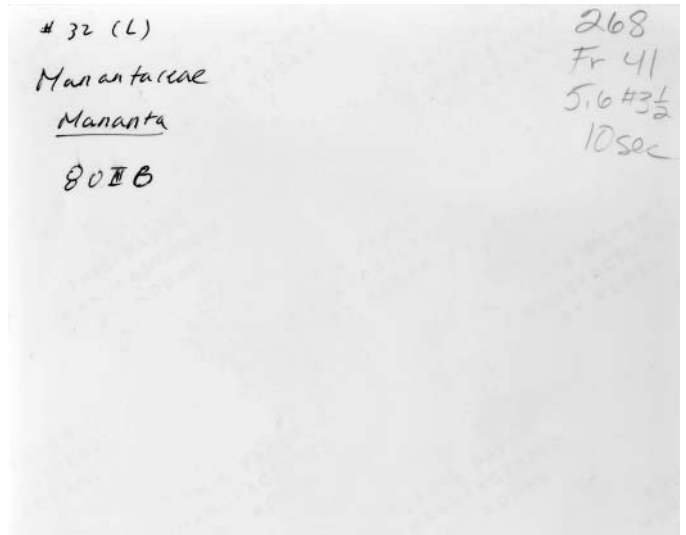
80IIIB card 1.JPG



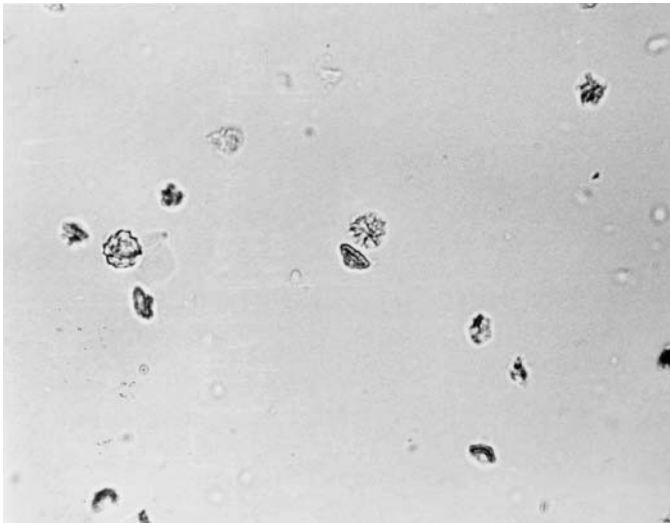
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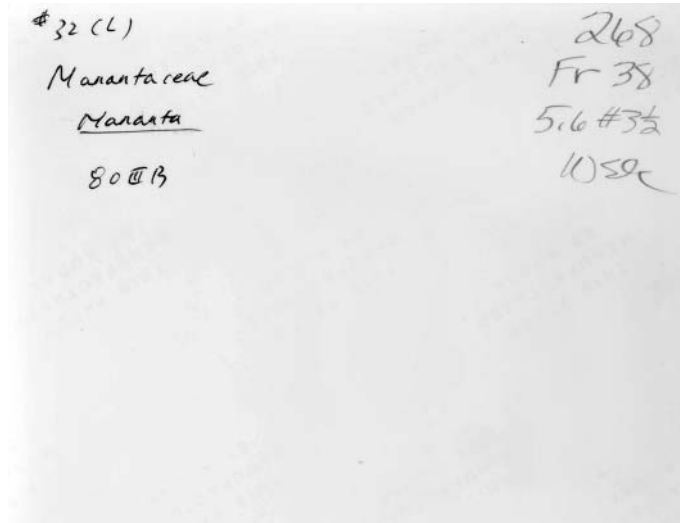
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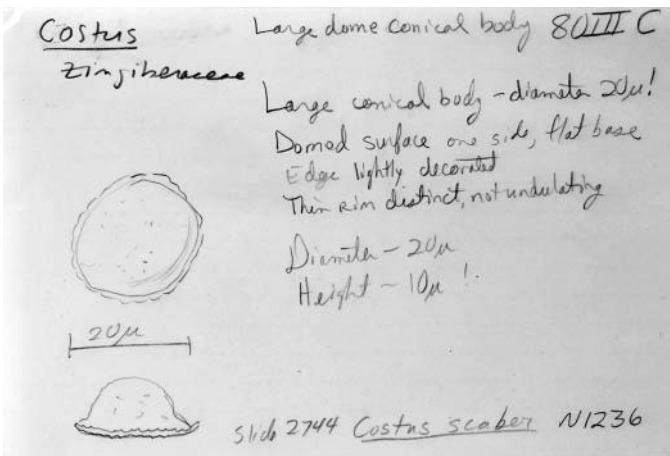
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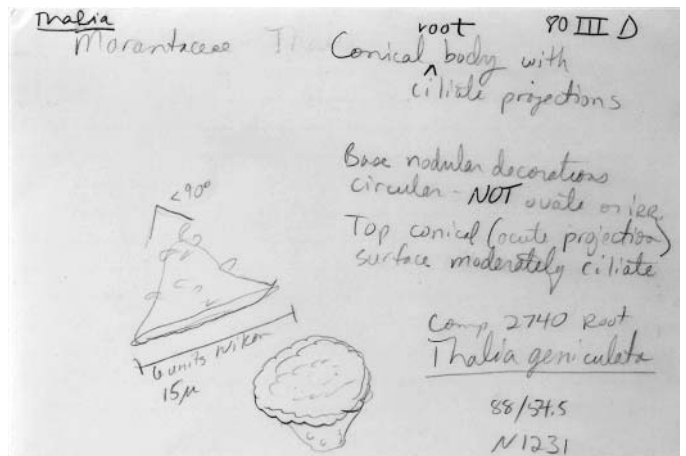
80IIIB photo 2f.JPG



80IIIB photo 2b.JPG



80IIIC card 1.JPG



80IIID card 1.JPG