

CATEGORY 40

Epidermal Appendages

40I. double-outline trichome (one part may or may not appear more silicified; “base” is often spherical-elliptical or can have “straight” edges)

40IA. armed

a. armed only on base

1. blunt tip

2. acute tip

b. armed on tip (Boraginaceae, *Cordia/Heliotropium* diagnostic)

40IB. non-armed

a. outer edge straight

1. acute tip

00. large size

A. elongated bottom; short tip

B. small, pistol-shaped base; long tip

01. moderate size

2. blunt tip

b. curved tip

1. length of base greater than or equal to $\frac{1}{2}$ length of tip

2. length of base less than $\frac{1}{2}$ length of tip

3. length of base less than $\frac{1}{2}$ length of tip; base flat to sinuous

c. base rounded to oblong

1. not blocky

00. acute tip

A. whole trichome

B. broken off tips

01. blunt tip

2. blocky; may have indentations or ridges

d. triangular

e. curved; base not apparent; may be circular in top view

f. base with obtuse angles (Burseraceae, *Trattinnickia peruviana*, genus level diagnostic)

40II. single outline, highly silicified trichome

40IIA. armed

a. armed on all parts

b. armed on base only

40IIB. non-armed

a. outer edge straight

1. acute tip

00. smooth or grainy surface

01. uneven surface

2. blunt tip

b. outer edge curved

1. acute tip

00. smooth surface

01. uneven surface*

02. grainy surface*

c. cone-shaped

1. small with widely flaring base*

2. small to moderate size; no base or small base

3. small, rounded base; irregular conical shape; interior space; spherical, verrucose cystolith inside (Bombacaceae, *Pseudobombax millei*, genus level diagnostic)

40III. hairs (slender; elongated; double or single outline; with or without “base”)

40IIIA. unicellular

a. short to medium length. (Most of these are thin relative to length, there are examples that are “long” by our definition)

1. straight edges

00. rounded tip

A. rough surface

B. original 40IIIAa100

01. acute tip

A. interior space*

B. no interior space

a. armed (Fabaceae, *Dalium guianense*, genus level diagnostic)

b. non-armed

2. curving

01. interior space [sic: no 00]*

02. no interior space

A. acute tip

a. smooth surface*

b. grainy surface*

B. blunt tip

a. smooth surface

1. angled

2. bulbous (Bombacaceae, *Matisia longipes*, species level diagnostic)

b. grainy surface

c. scaled surface (*Dalium*, Fabaceae, genus level diagnostic)

3. hooked end

00. rounded interior space; small

A. old 40IIIAa300, *Phaseolus* (Fabaceae) hooked hair (genus level diagnostic)

B. hooked end is sharply recurved (Fabaceae, *Dalium guianense*, genus level diagnostic)

01. acute interior space; larger (Poaceae, *Pharus glaber*, not used as diagnostic)

02. double interior space (Euphorbiaceae; *Cleidium cf. castaneifolium*, genus level diagnostic)

b. long (many of these have thick bases)

1. armed

00. curving (Boraginaceae, *Cordia lutea*, species level diagnostic)

01. bent at a right angle from base (Moraceae, *Artocarpus altilis*, family level diagnostic)

2. non-armed

00. smooth surface

A. no base, or base seen as separate cell

a. interior space

1. double interior space (Flacourtiaceae,

Pleuranthodendron lindenii, family level diagnostic)

2. old 40IIIAb200Aa

b. no interior space

1. long to very long

2. relatively short (Bombacaceae, *Matisia longipes*, species level diagnostic)

B. base occurs as part of same cell

a. base flat

b. Attachment of hair to base “v”-shaped

(Ulmaceae, *Trema* spp., genus level diagnostic)

c. base spherical (Boraginaceae, *Lithospermium carolinense*).

Tips also break off, acute inner space

d. attachment of base to hair is rounded (*Watteria*, Sterculiaceae)

01. grainy surface (Boraginaceae, *Heliotropium angiospermum*,
genus level diagnostic)

40IIIB. multicellular hairs

a. segmented hairs

1. armed, large, no interior space NEED TO REVIEW--MOST HAVE THIS.

Check overlap with Piper aduneum hairs. (Asteraceae diagnostic)

2. non-armed

00. small, smooth

01. large, smooth, no interior space

(diagnostic to Asteraceae/Cucurbitaceae, *Cucurbita*)

CHECK TO SEE IF CAN SEPARATE THESE BASED ON SHAPES:

DATABASE PHOTO IS WRONG PLANT

02. large with interior space

A. can have roughened edges (Euphorbiaceae, *Croton fraseri*,
species level diagnostic)

B. *Piper* type, smooth edges, elongated acute tip,
restricted interior spaces

03. tip blunt

A. tip blunt and broad (Bombacaceae, *Quarariba cf. grandifolia*,
genus level diagnostic)

B. tip blunt, rounded elongated tip, grainy surface texture,
individual segments broad and squarish. (*Piper aduneum*)

b. radiating or stellate hairs

40IV. bases (epidermal cells)

40IVA. radiating appendages

a. discernable center

1. many irregular appendages; obtuse

2. long, regular appendages; acute

00. no surrounding epidermal cells

A. old 40IVAA2, flat base

B. central cell overlaid with small cells; tall in side view

a. Large, 30-50 μ (Burseraceae, *Trattinnickia peruviana*,
genus level diagnostic)

b. Small, constricted at center: <25 μ (*Casearia sylvestris*)
(Flacourtiaceae)

01. surrounding epidermal cells attached to form disk;
appendages relatively short

A. darkened

a. small (Bombacaceae, *Quarariba cf. grandifolia*,
genus level diagnostic)

b. large, with quadrilateral surrounding cells; tall in side view
(Fabaceae, *Inga densiflora*, genus level diagnostic)

4. Central cell is distinctive in being more highly silicified, sometimes 2 cells, 4 μ
(Piper) CHECK

c. Very 3-D, uniform rounded cells, 3-D in shape comprising 3-D mass, sometimes concave
(*Piper aduneum*)

40IVD. [sic: no C] spherical hair base; smooth (no rings) (Asteraceae/Cucurbitaceae diagnostic)
Central spherical (large) cell surrounded by rounded cells. May form a large 3-D mass of
rounded cells RECHECK SLIDE RE OVERLAP Q

40IVE. tear-drop shaped hair base; rough surface

40IVF. stellate center

a. projections short, or mere points; may have crystalline inclusions (Bignoniaceae,
Tecoma gandichiandi, genus level diagnostic)

b. projections medium length; with or without surrounding epidermis

c. long projections; with attached peripheral epidermis (Moraceae, *Ficus americana*,
family level diagnostic)

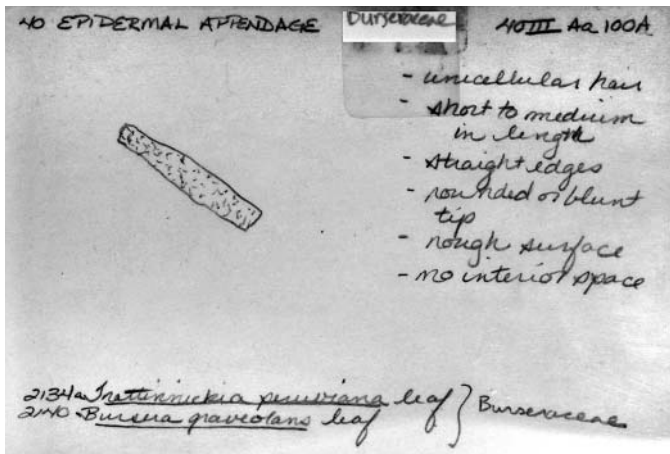
d. very small stellate center embedded in a well silicified body; 1 more ephemeral ring
(Moraceae, *Artocarpus altilis*, family level diagnostic)

40IVG. triangular shape

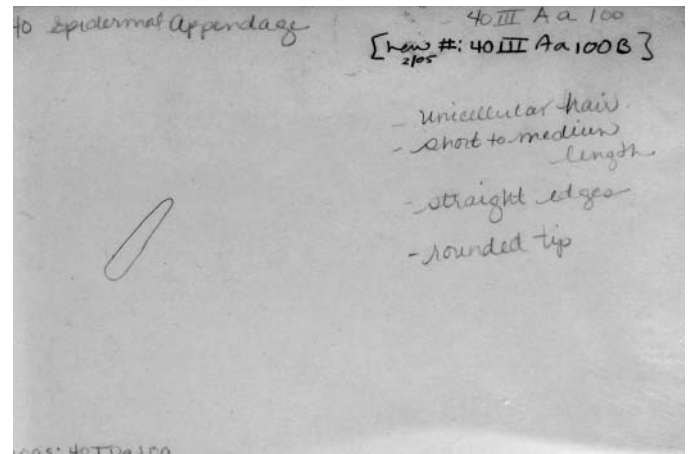
40IVH. quadrilateral shape

40IVN. flared shape [sic: no I-M]

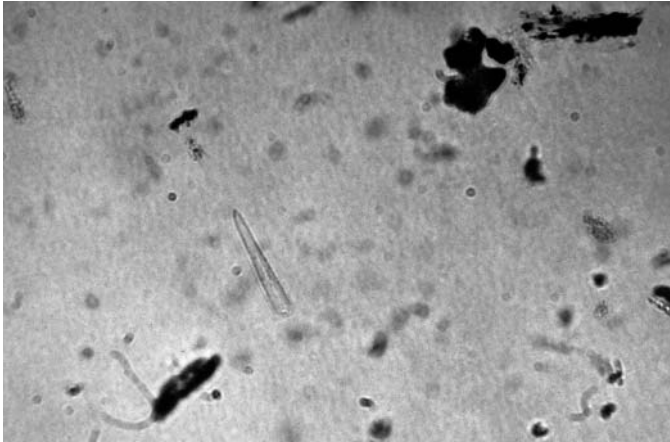
*No card in MU card file



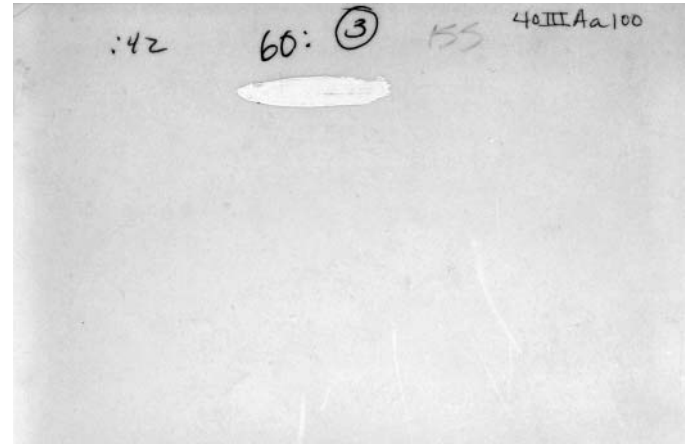
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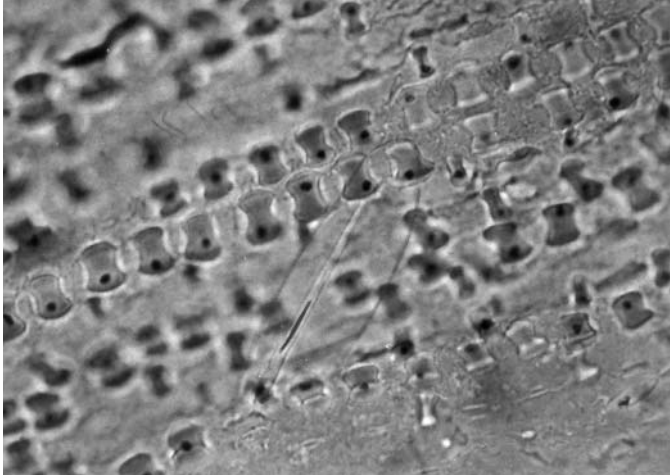
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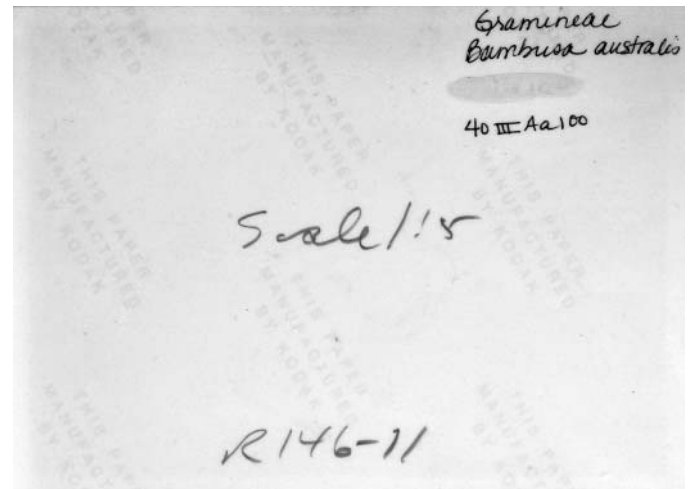
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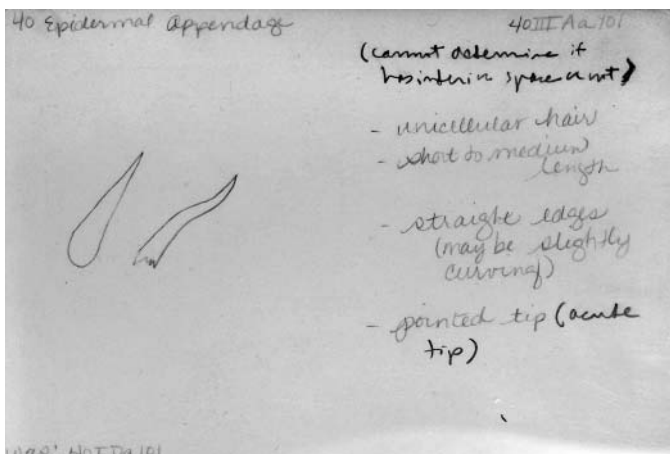
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40III Aa 100B photo 2f.JPG



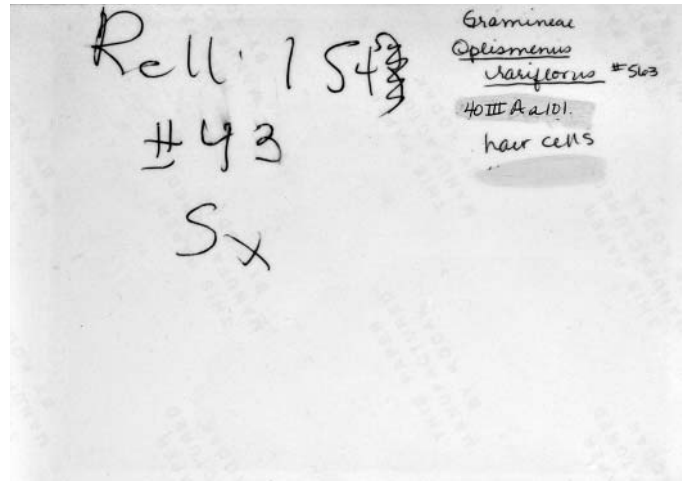
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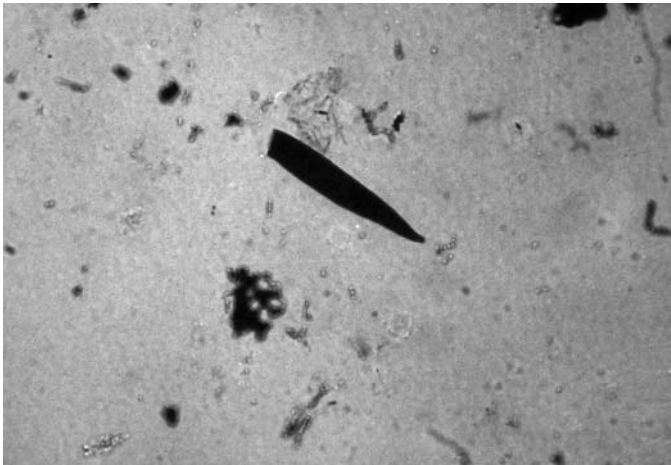
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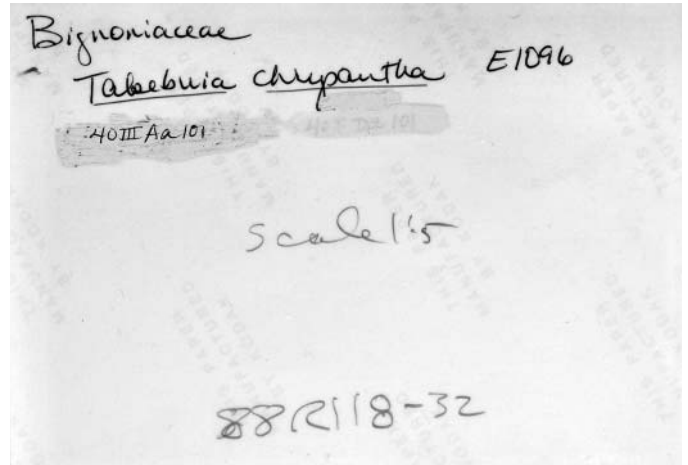
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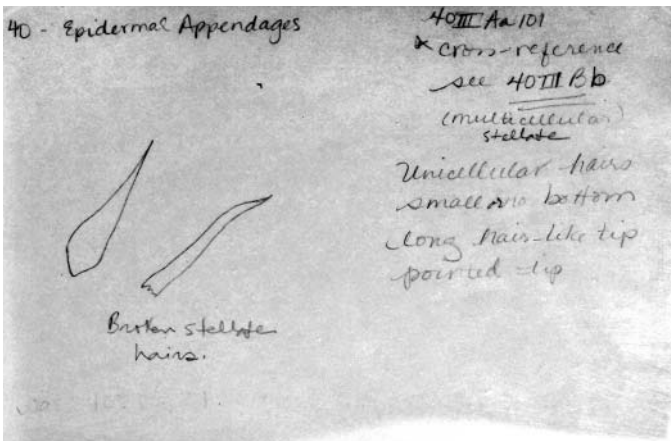
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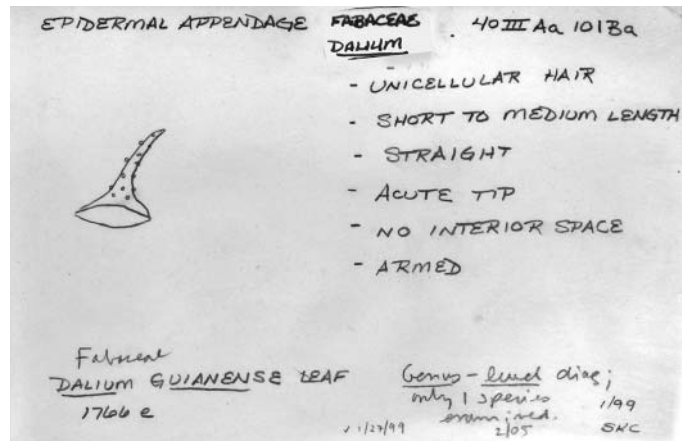
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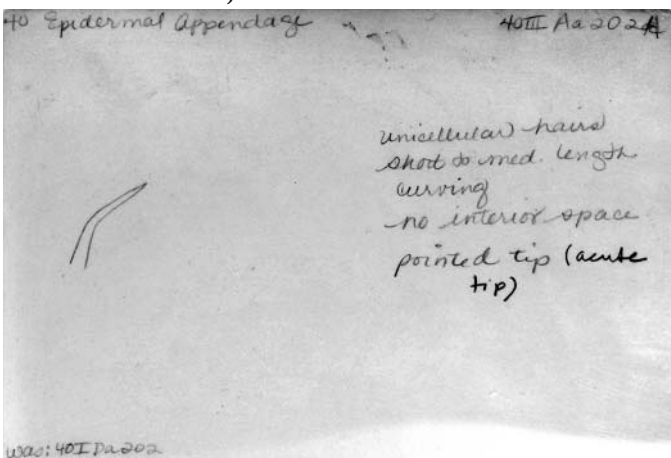
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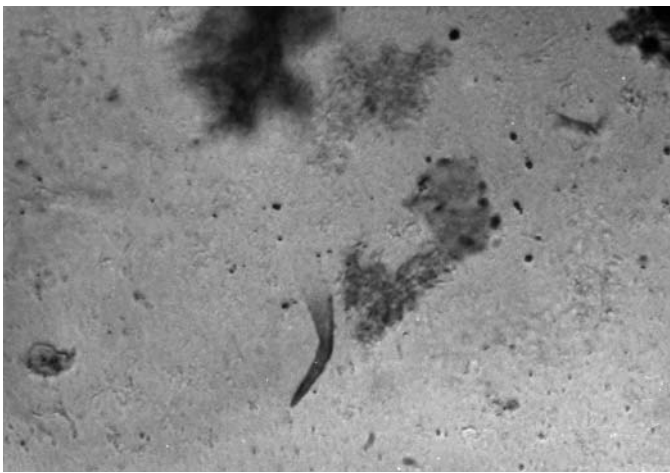
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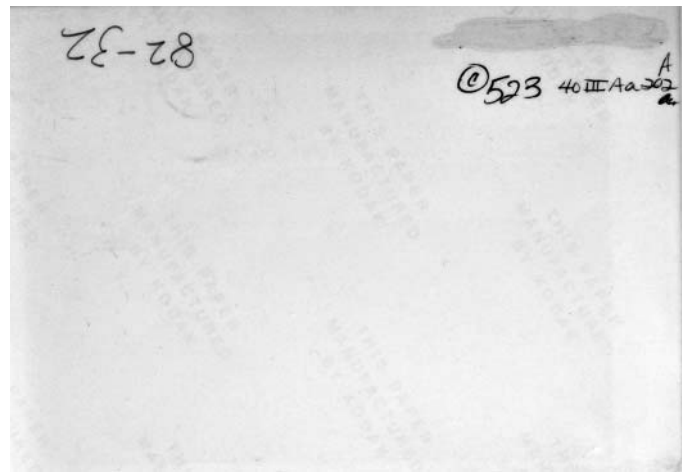
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40IIIAa202A card 1.JPG



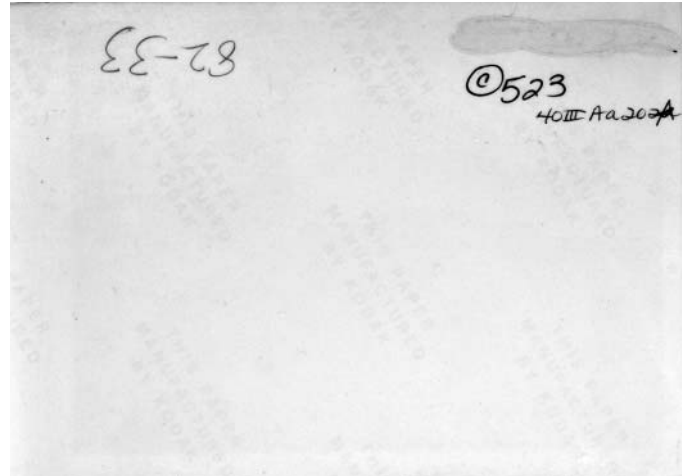
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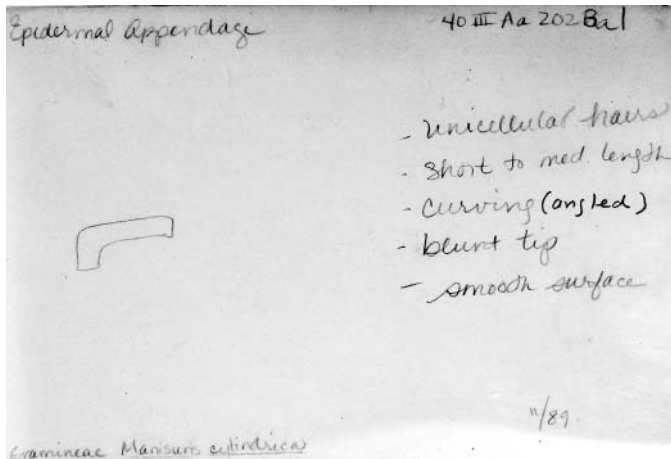
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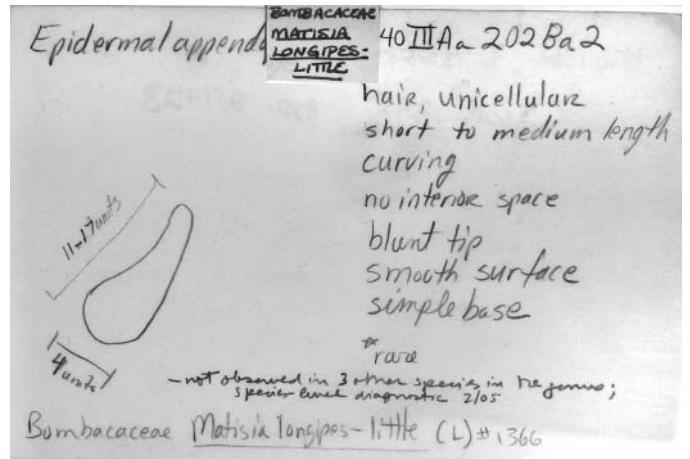
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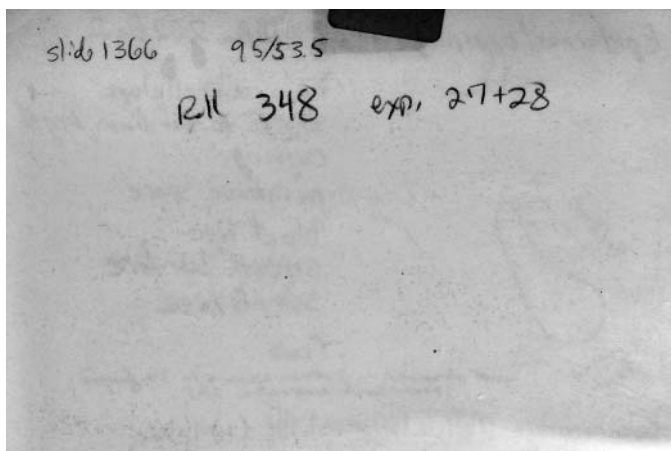
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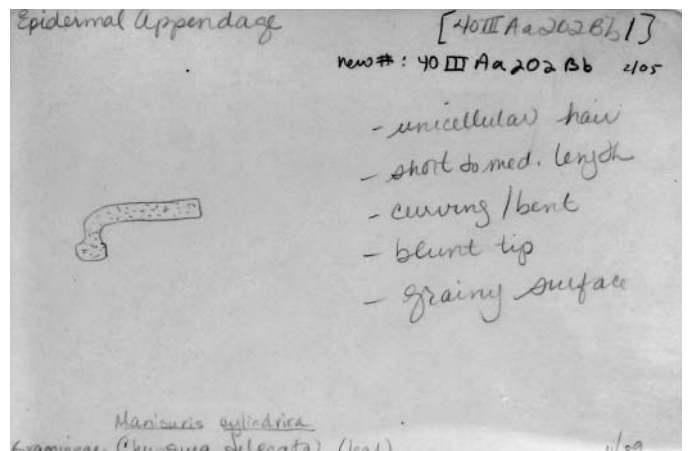
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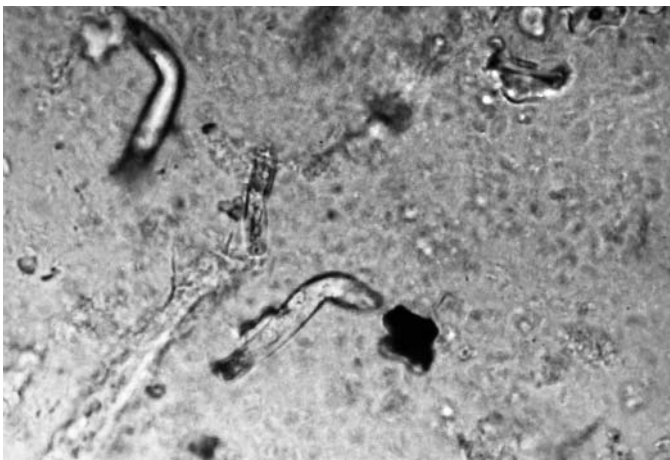
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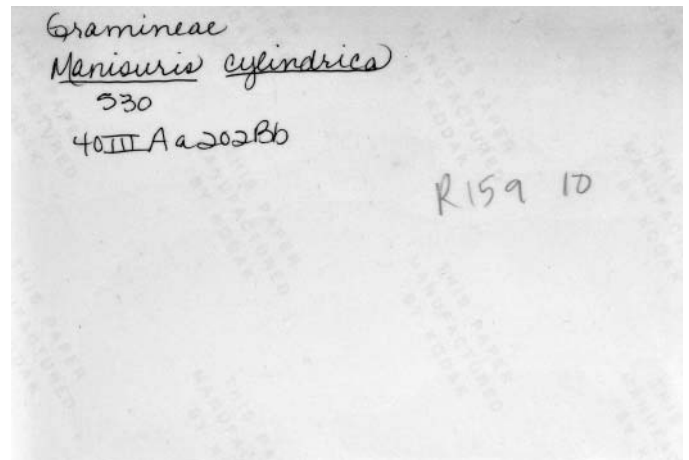
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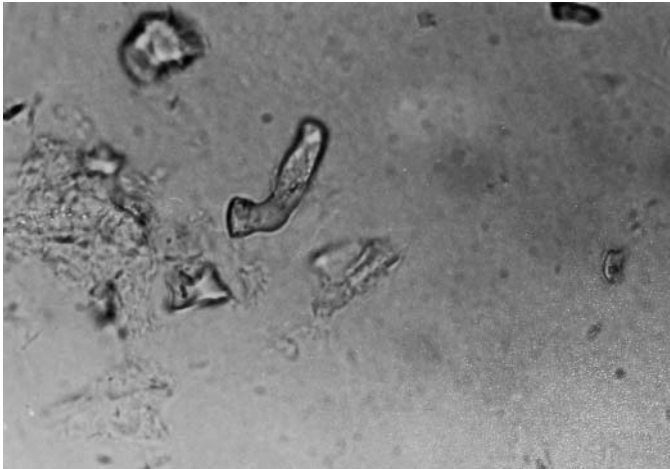
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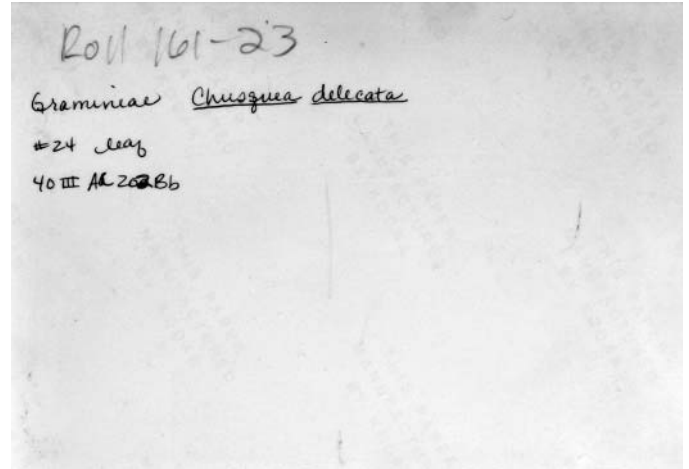
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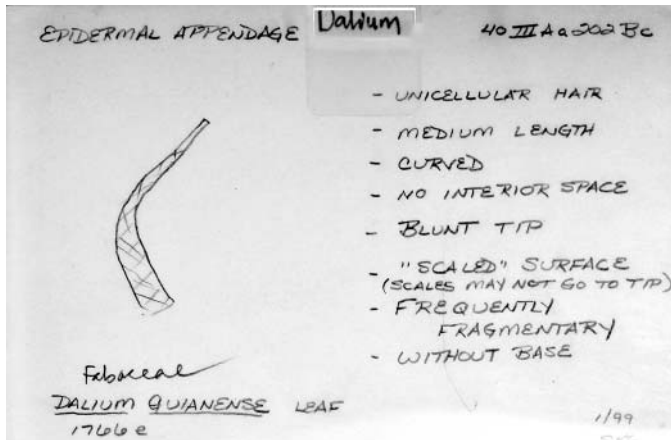
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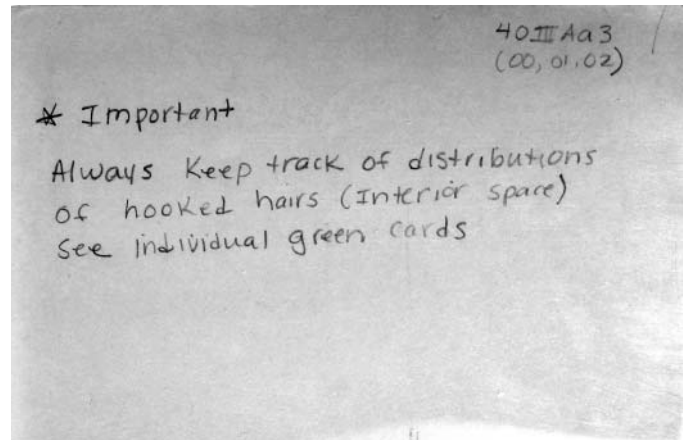
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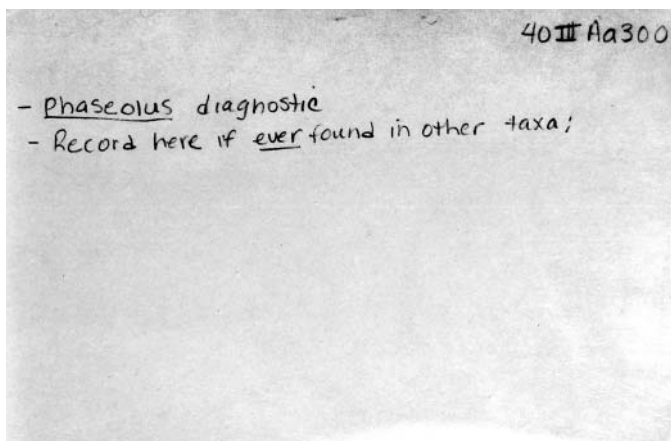
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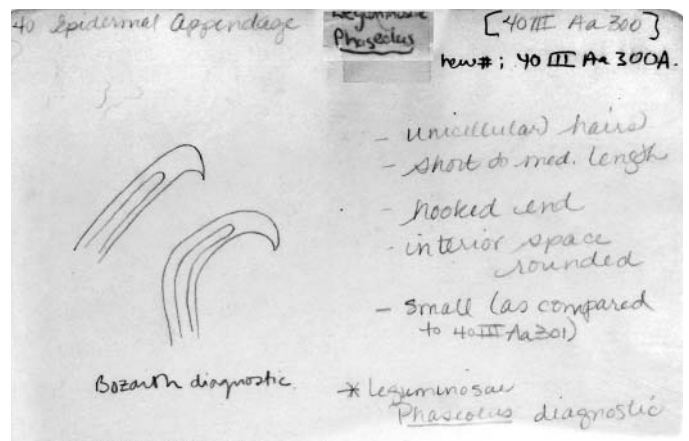
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40IIIAa3 card 1.JPG



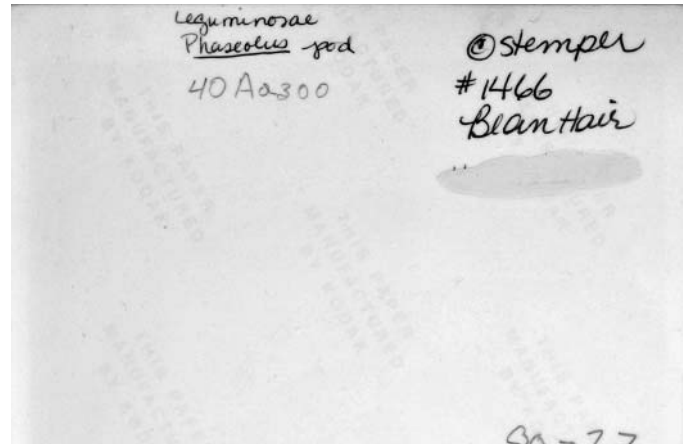
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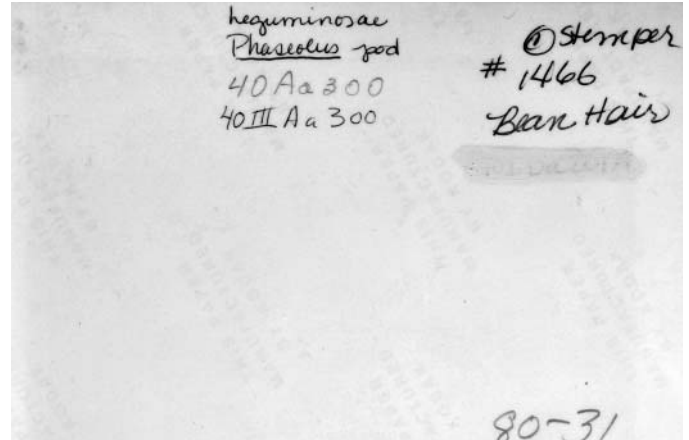
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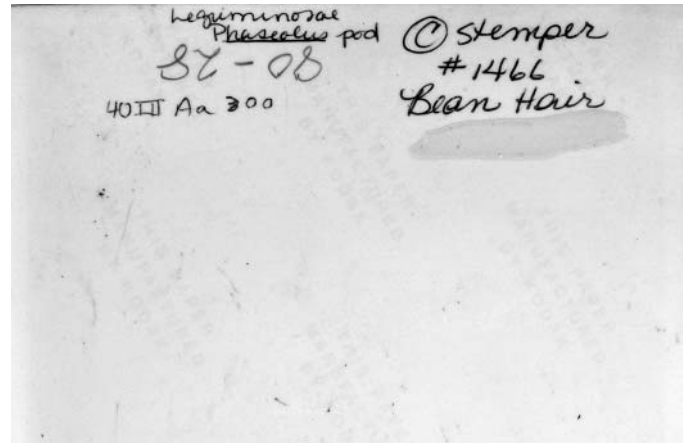
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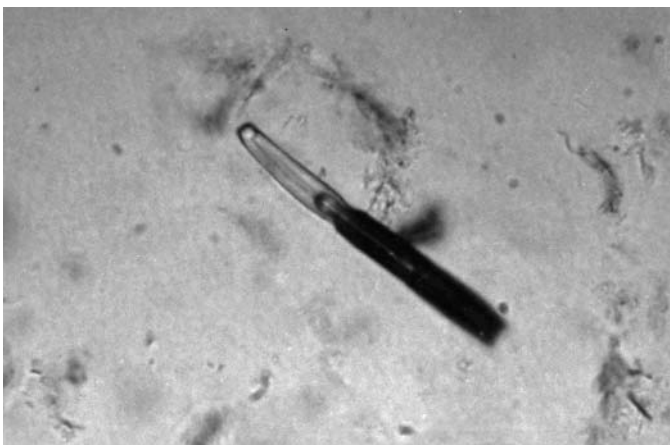
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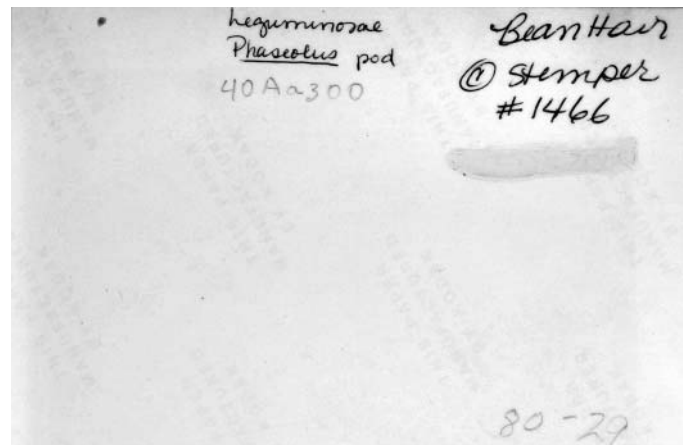
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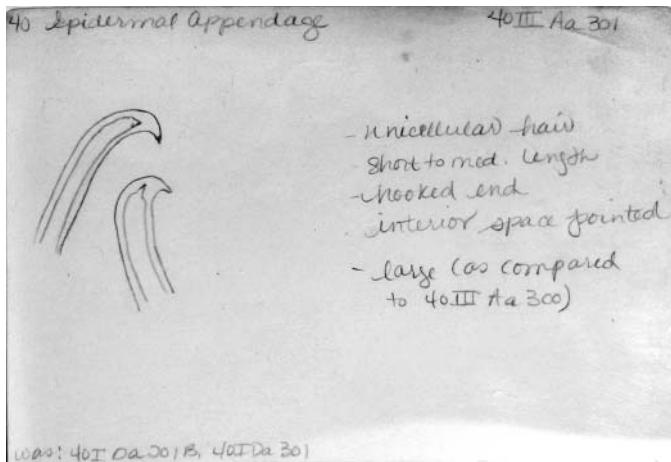
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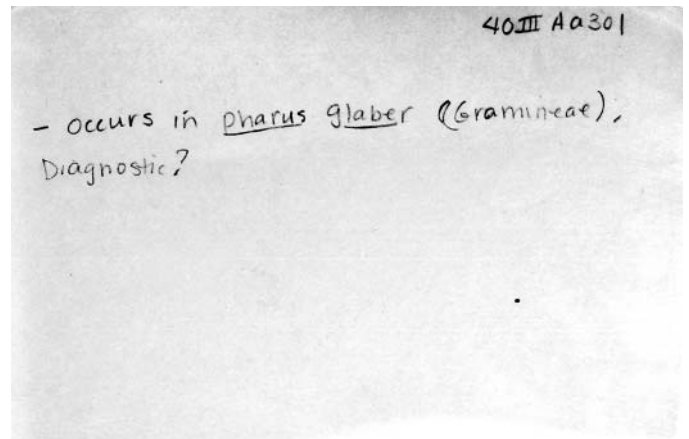
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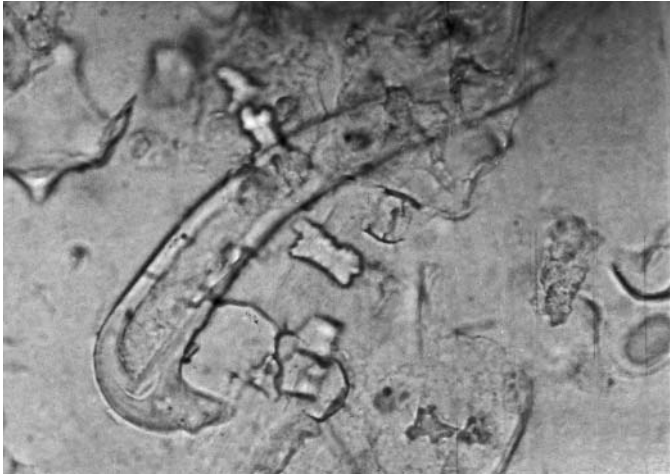
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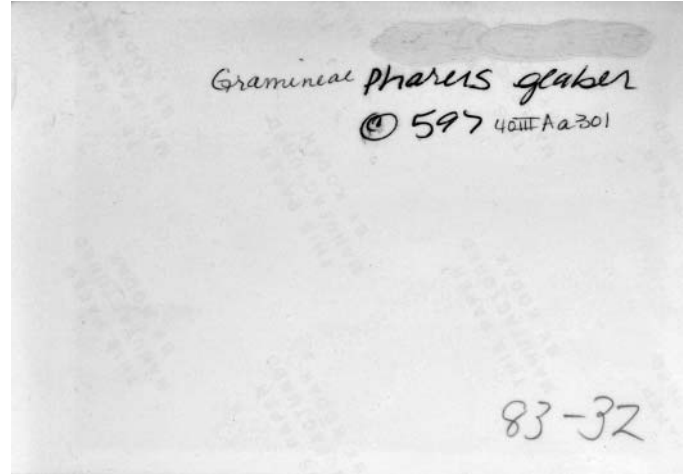
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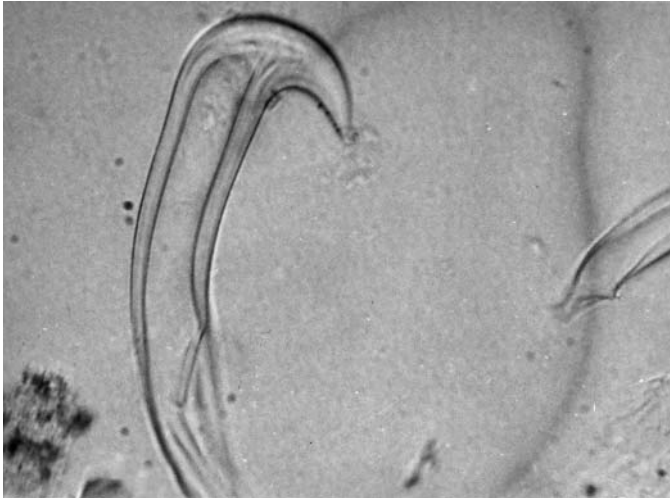
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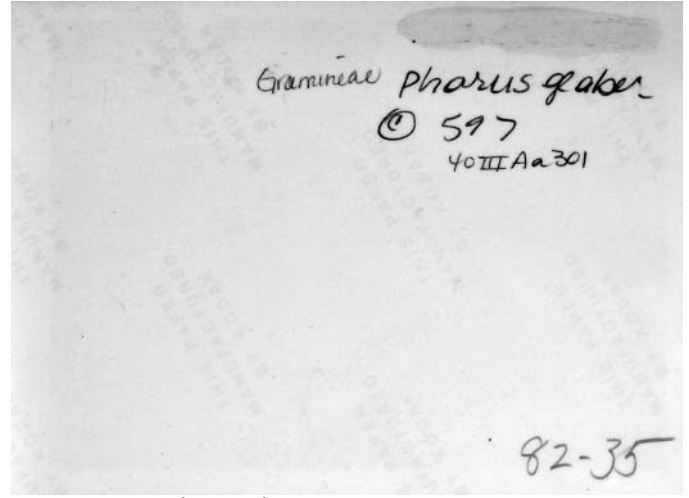
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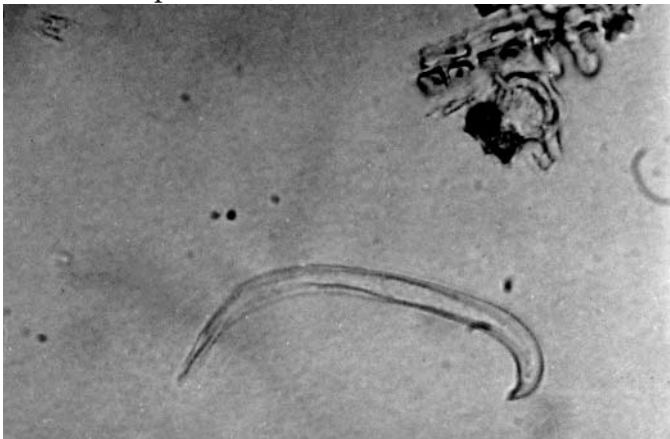
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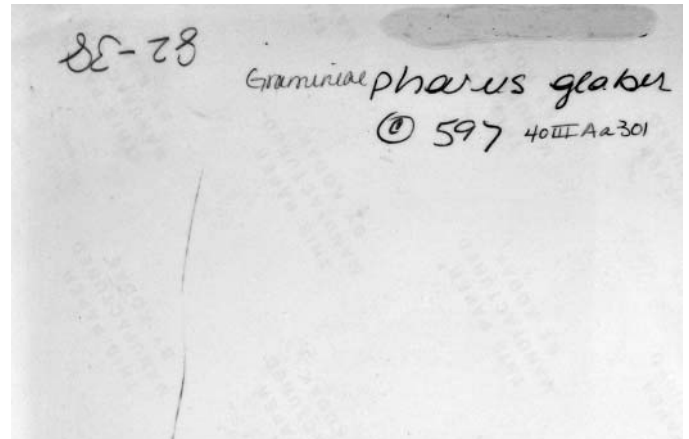
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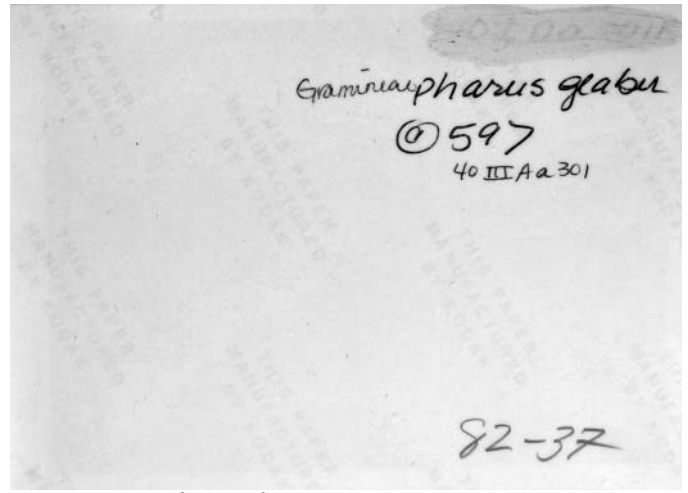
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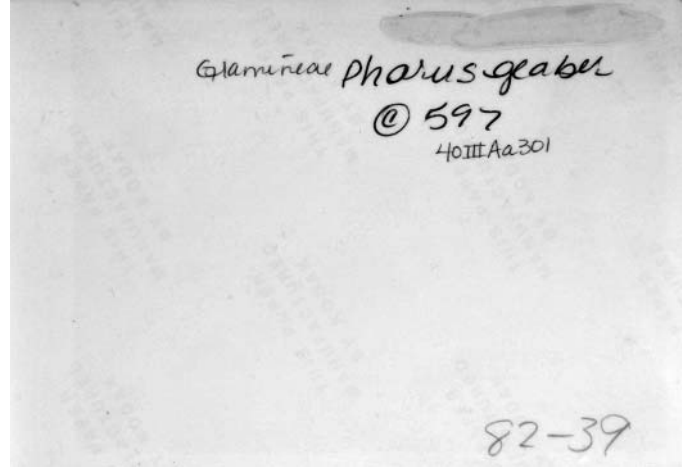
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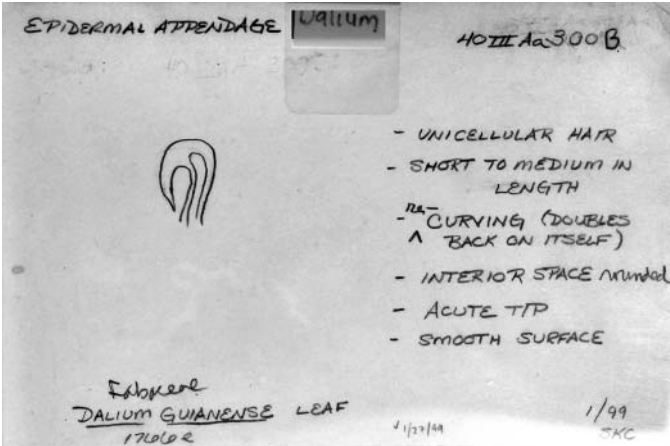
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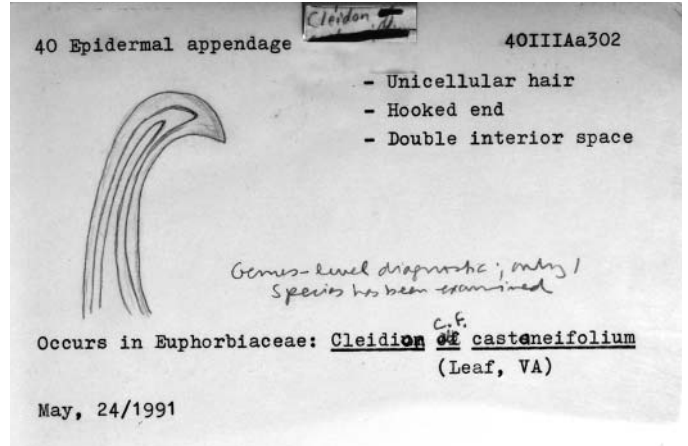
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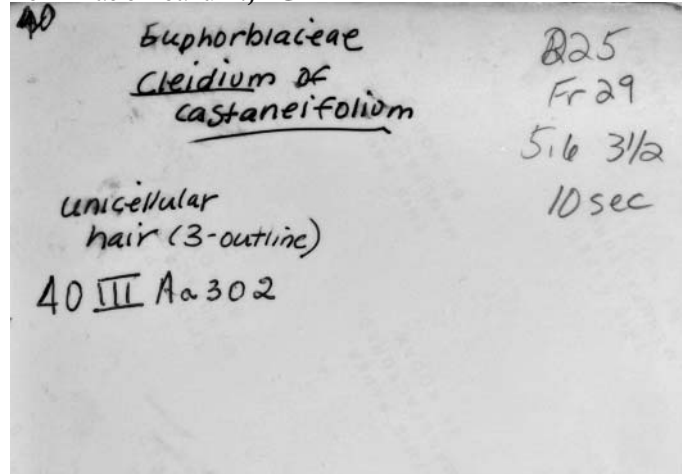
40IIIAa300B card 1.JPG



40IIIAa302 card 1.JPG



40IIIAa302 photo 1f.JPG



40IIIAa302 photo 1b.JPG

40 III Aa 302

- occurs in Euphorbiaceae Cleidium & casereifolium
diagnostic?

40 III Aa 302 card 2.JPG

40 Epidermal appendage

Cordia LUTEA
Boraginaceae [40 III Ab 1]

- Unicellular hair
- Long
- Curving
- Interior space
- Armed

hw#: 40 III Ab 100
205

Occurs in Boraginaceae: Cordia lutea Fruit (R)

Species limit - several other
Species studied

40 III Ab 100 card 1.JPG



40 III Ab 100 photo 1f.JPG

40 III Ab 1

Cordia lutea E10
Boraginaceae 1/15

880114-20

40 III Ab 100 photo 1b.JPG



40 III Ab 100 photo 2f.JPG

Boraginaceae 238
Cordia lutea Fr 10
471 (Fruit)
40 III Ab 1 5.6#3
10 sec

40 III Ab 100 photo 2b.JPG

Moraceae

Armed hair in ^{right} angle from base

Bent, not curving
often w/ attached tissue

Multiple outline

40 III Ab 101

Artocarpus ~~altiss~~
altiss

40 III Ab 101 card 1.JPG

Flacourtiaceae

40 III Ab 200Aa 1

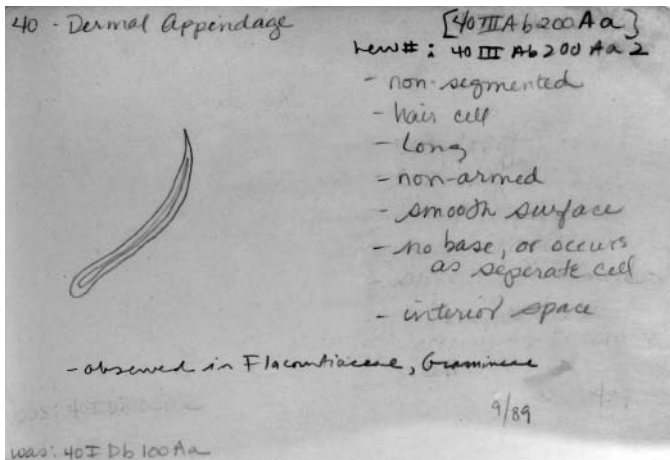
Long unicellular
hair

double interior
space

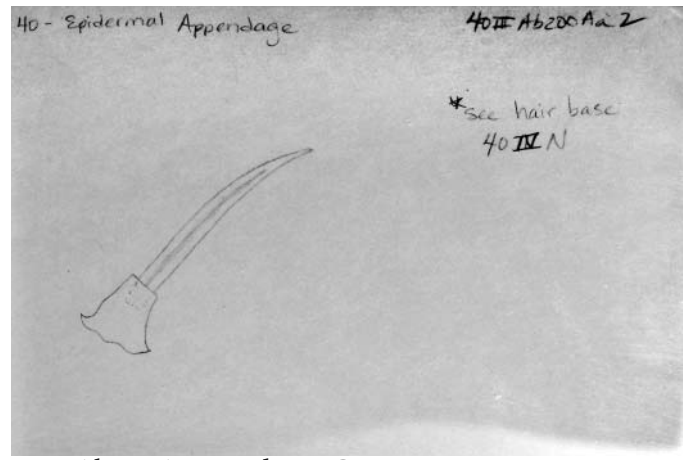
acute tip

Flacourtiaceae, Pleuranthodendron lindneri
1377, leaf

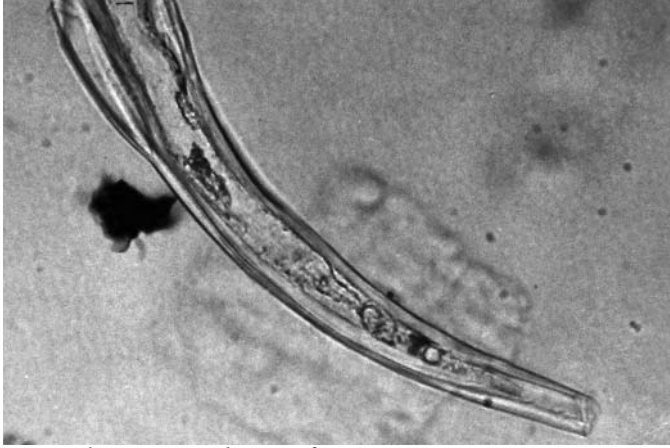
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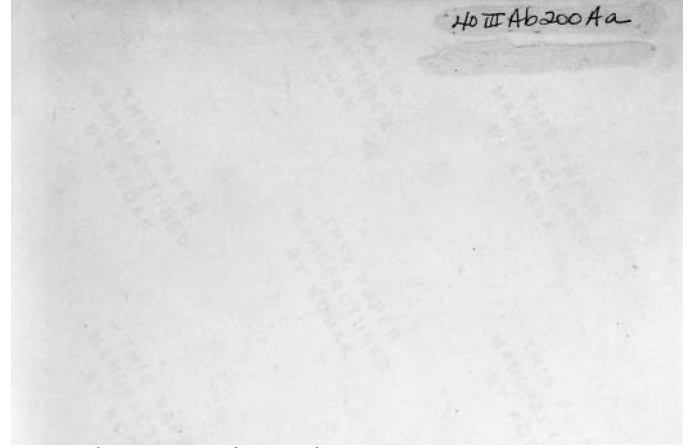
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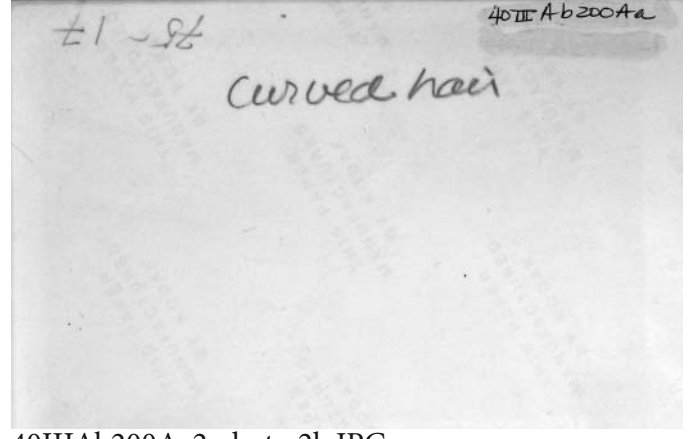
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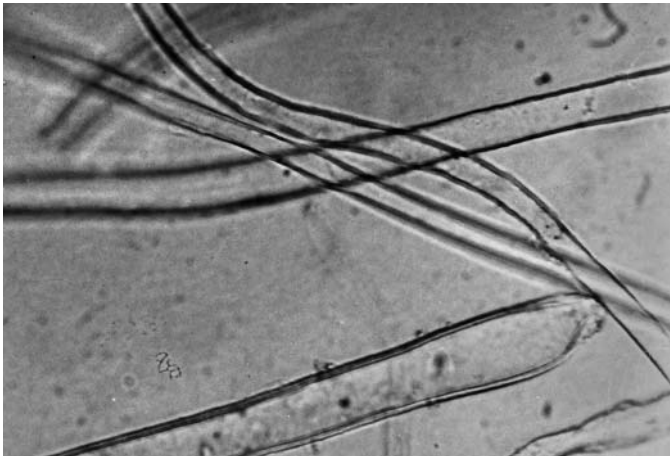
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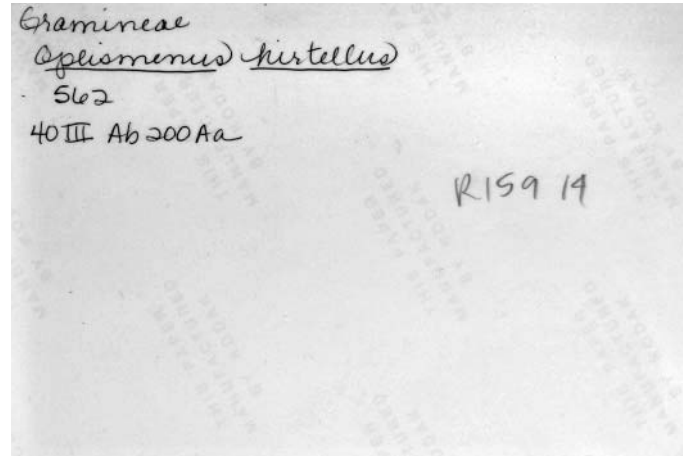
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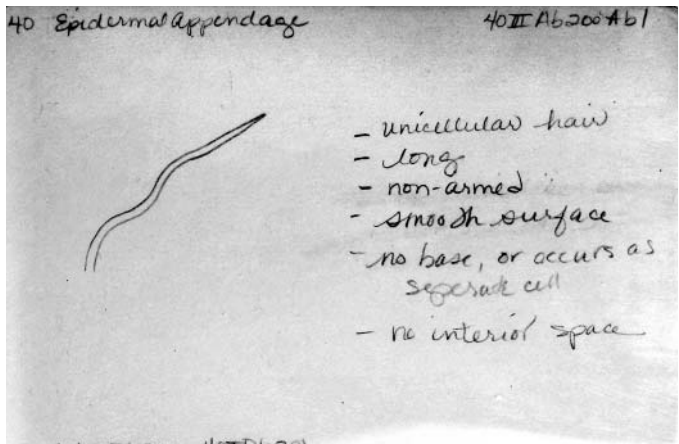
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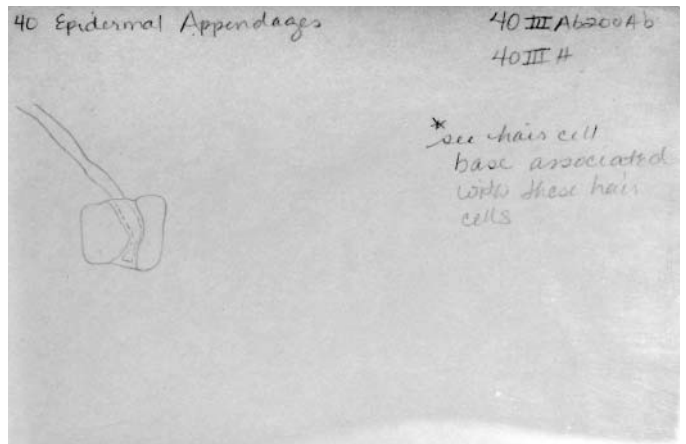
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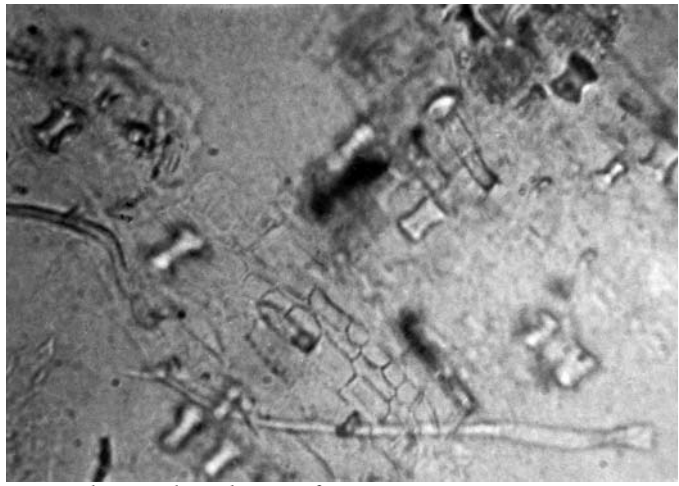
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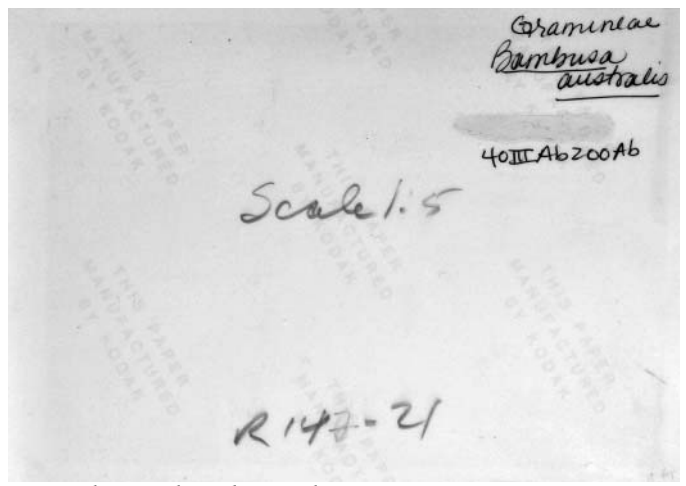
was: 40IDb200, 40IDb201
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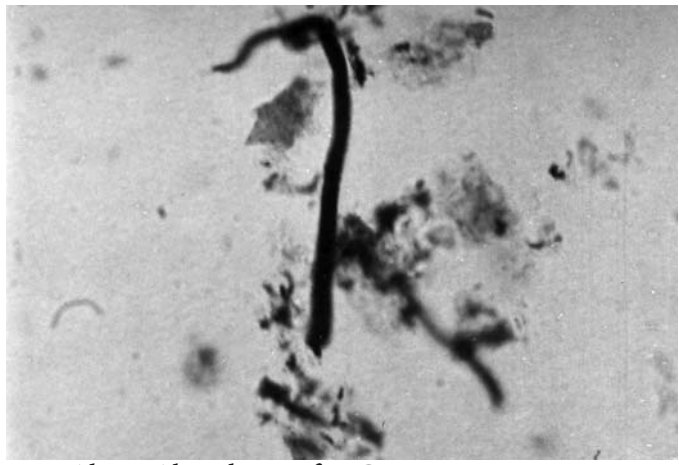
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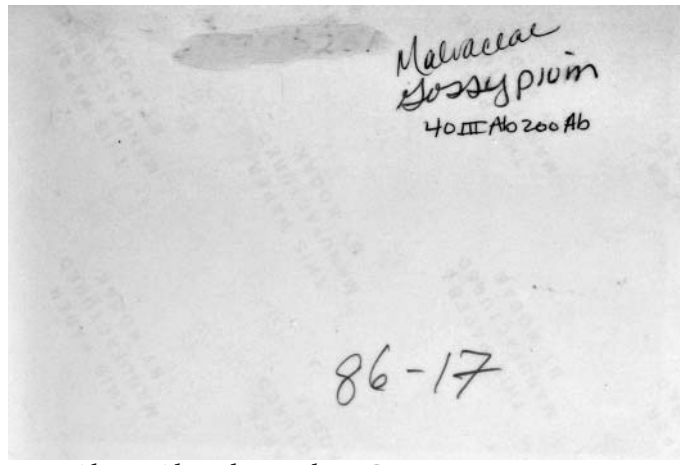
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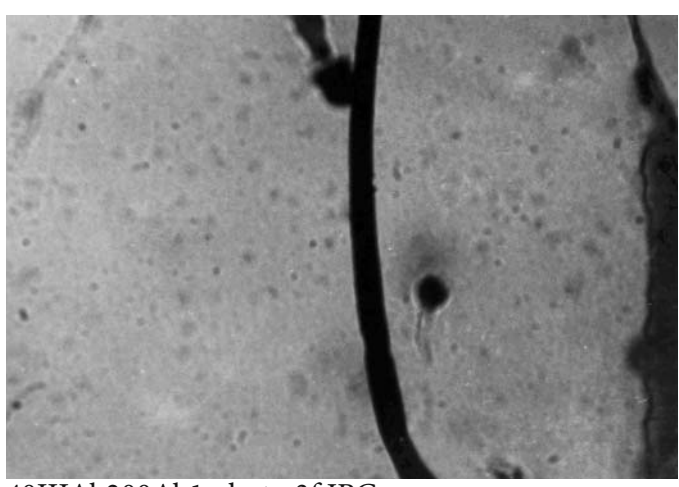
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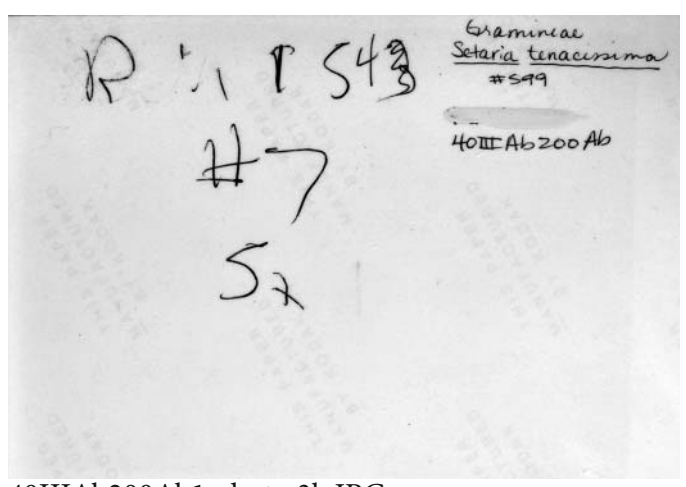
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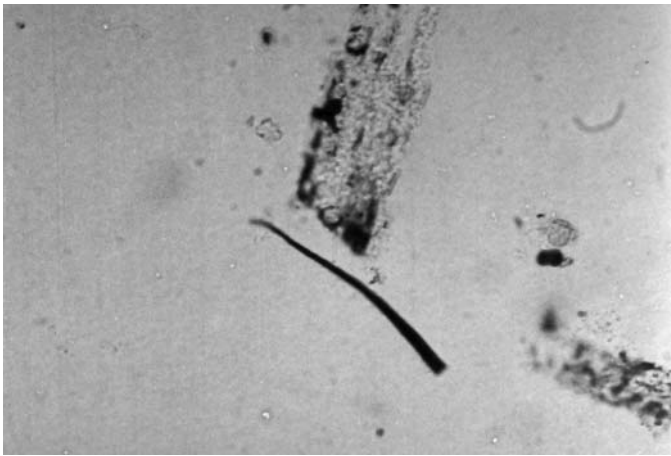
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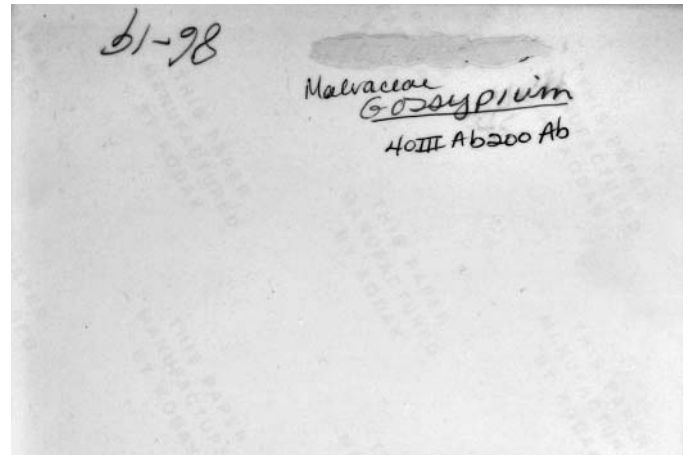
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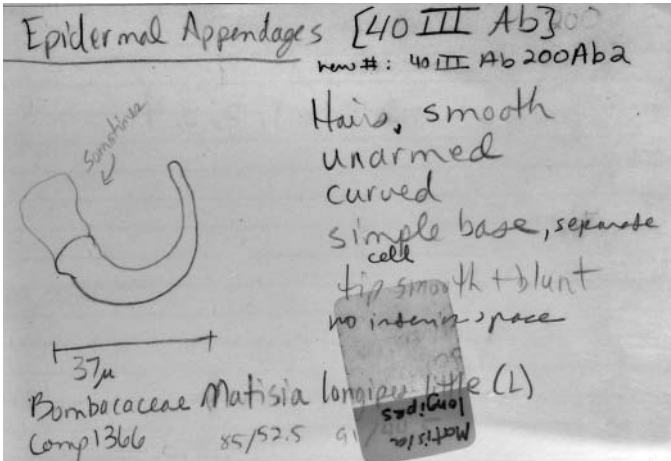
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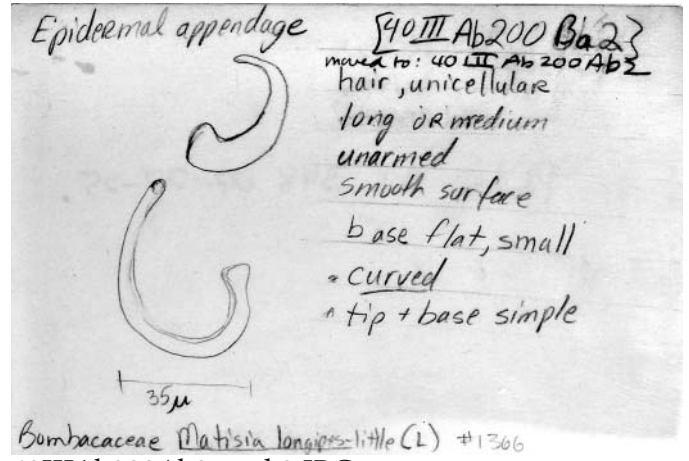
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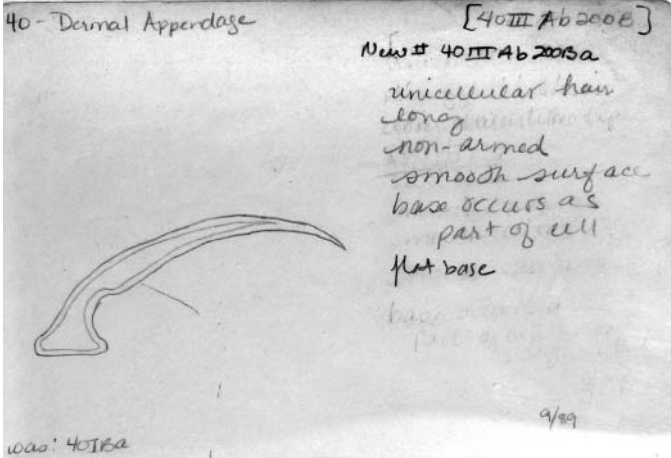
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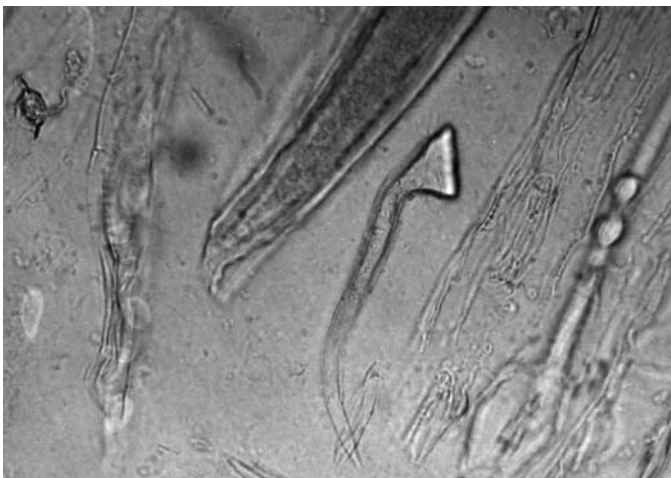
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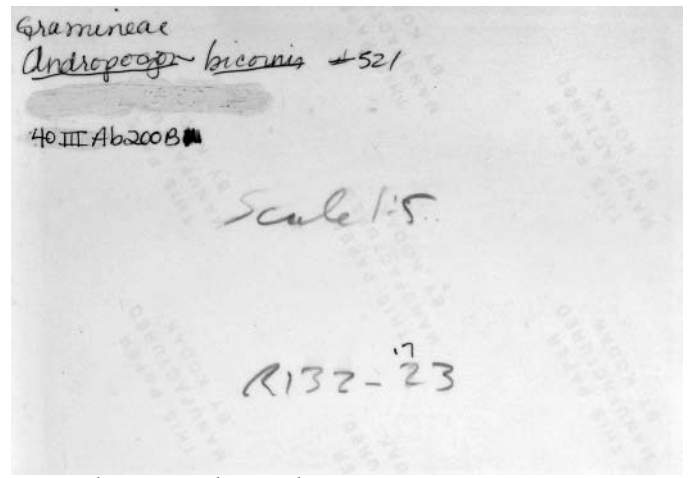
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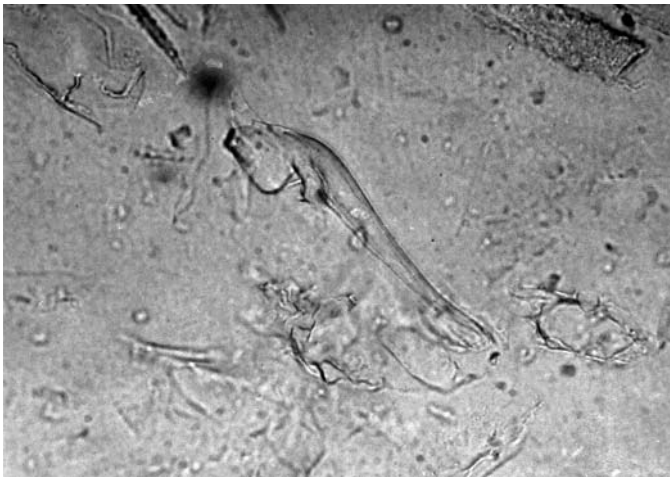
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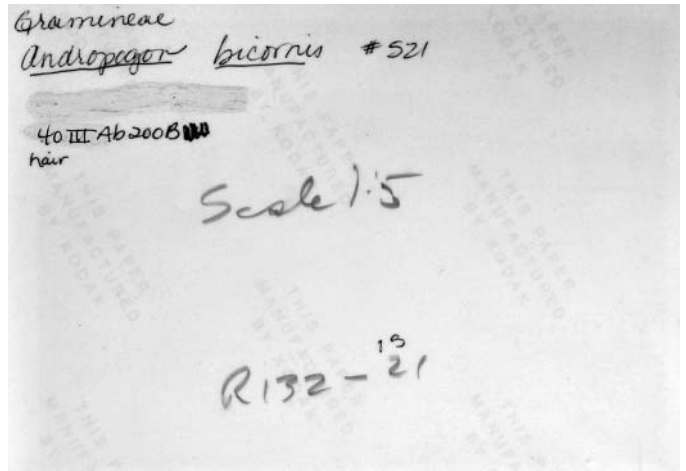
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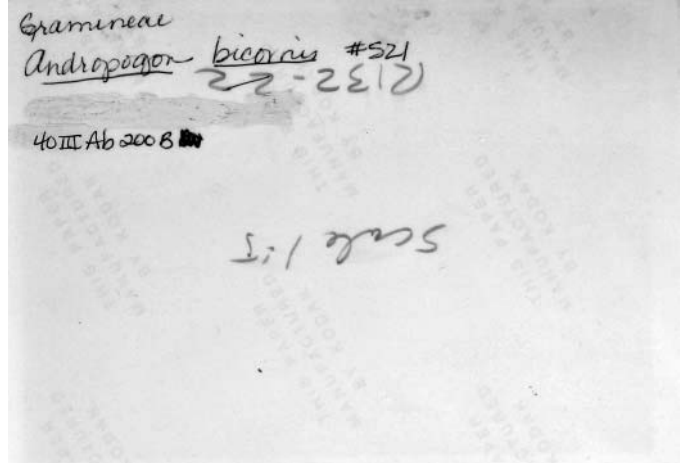
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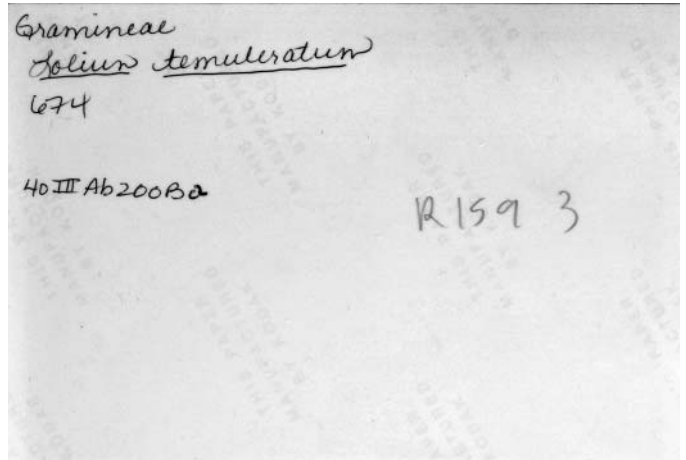
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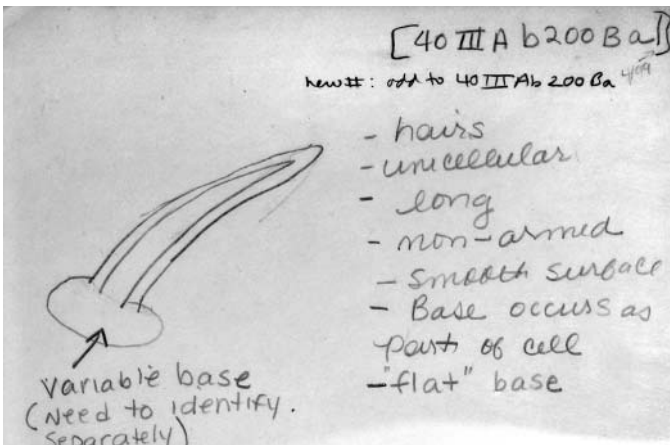
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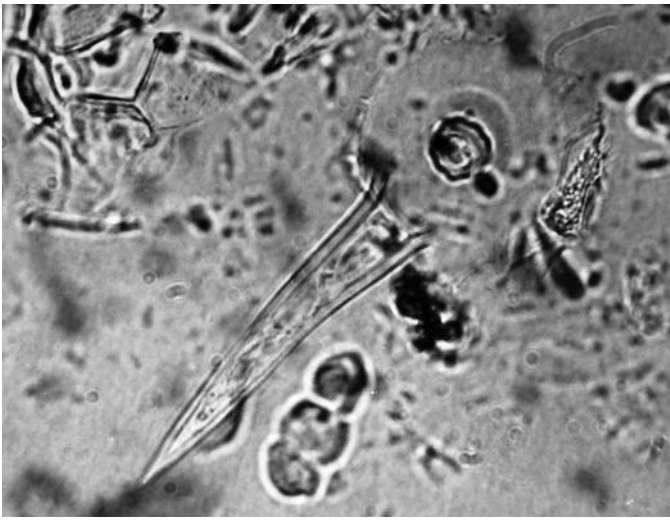
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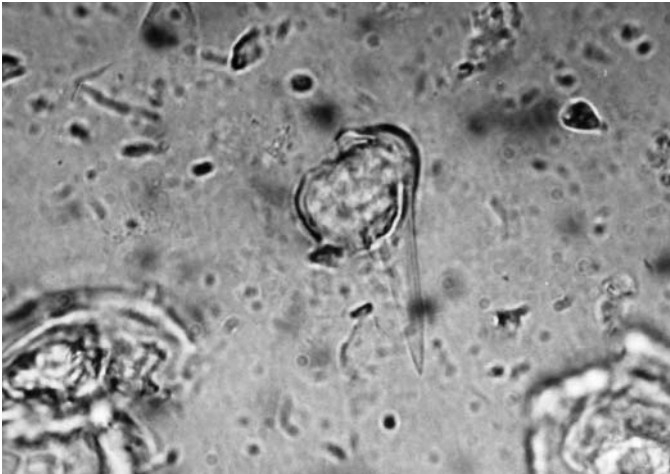
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40IIIAb200Ba photo 5f.JPG

Ulmaceae 237
Trema inteperrima #464 (leaf) Fr 13
40 III Ab 200Ba 950c

40IIIAb200Ba photo 5b.JPG



40IIIAb200Ba photo 6f.JPG

Ulmaceae 237
Trema inteperrima
#464 (leaf) Fr 11
40 III Ab 200Ba 950c

40IIIAb200Ba photo 6b.JPG



40IIIAb200Ba photo 7f.JPG

Ulmaceae 237
Trema inteperrima
#464 (leaf) Fr 12
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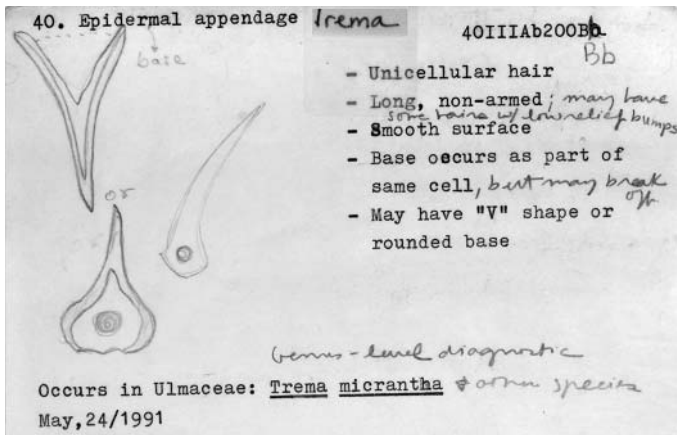
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40IIIAb200Ba photo 8f.JPG

Ulmaceae 237
Trema inteperrima
466 L.
40 III Ab 200Ba
323
43

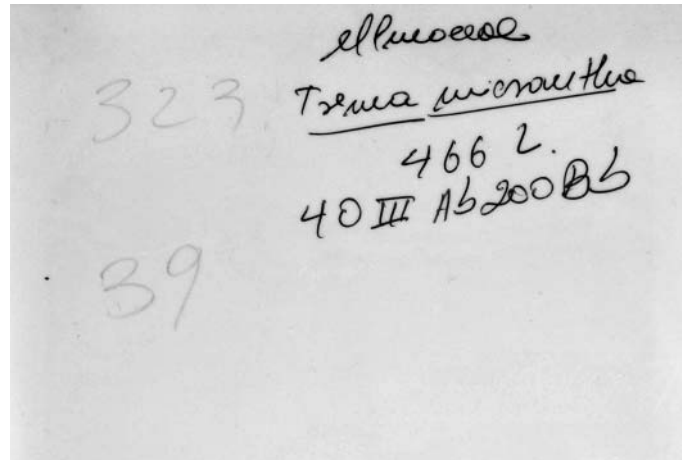
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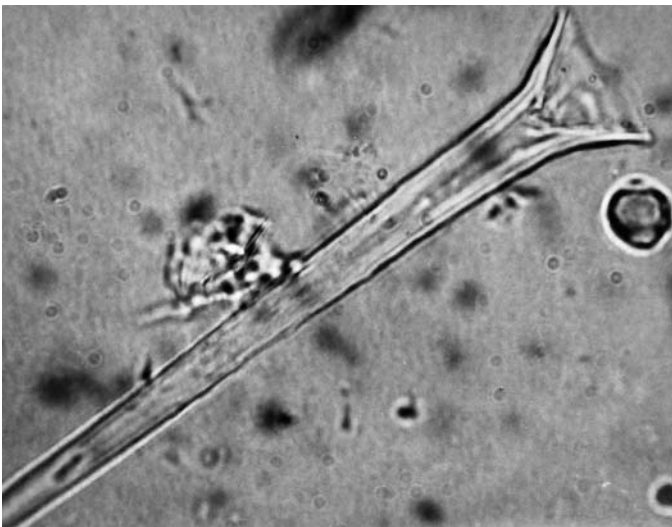
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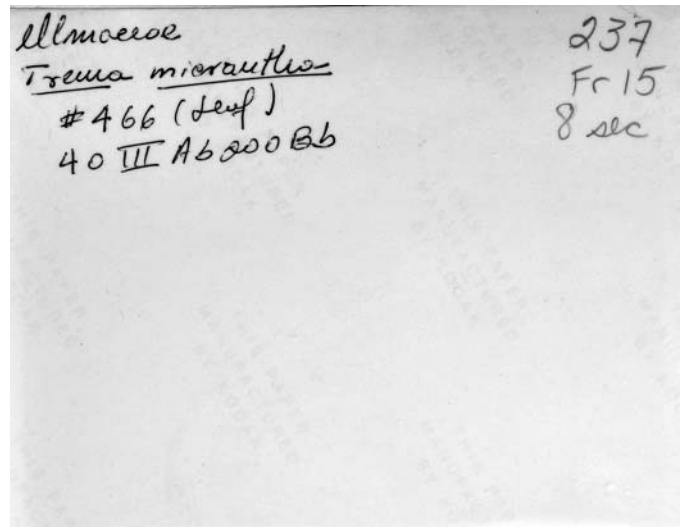
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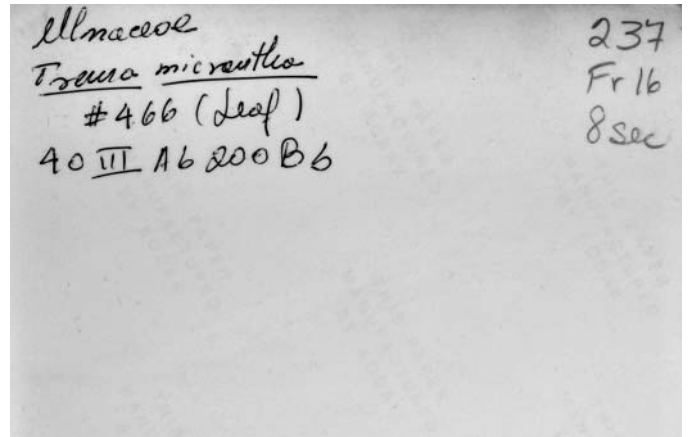
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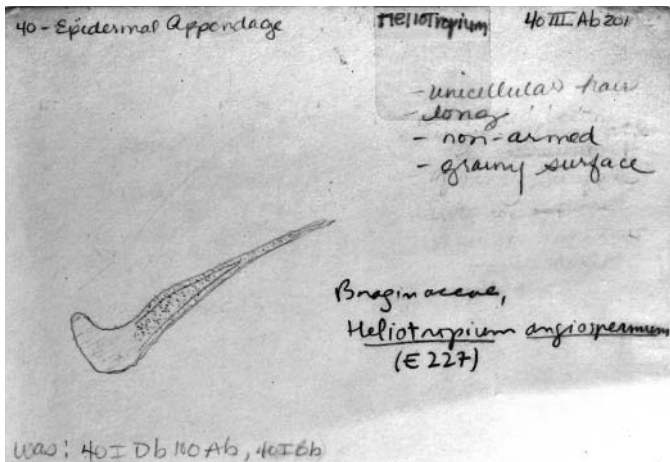
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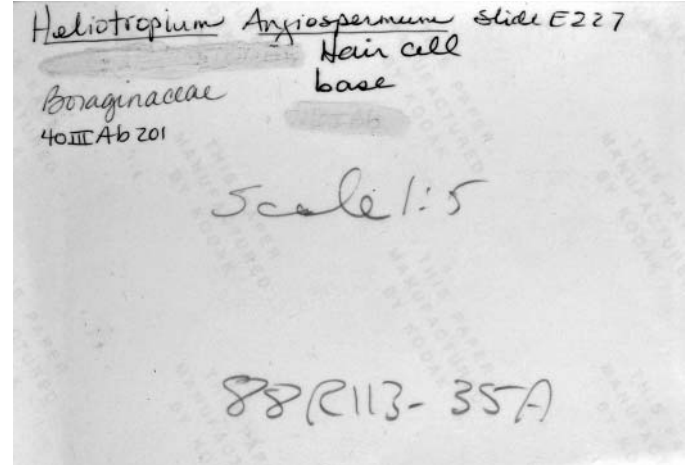
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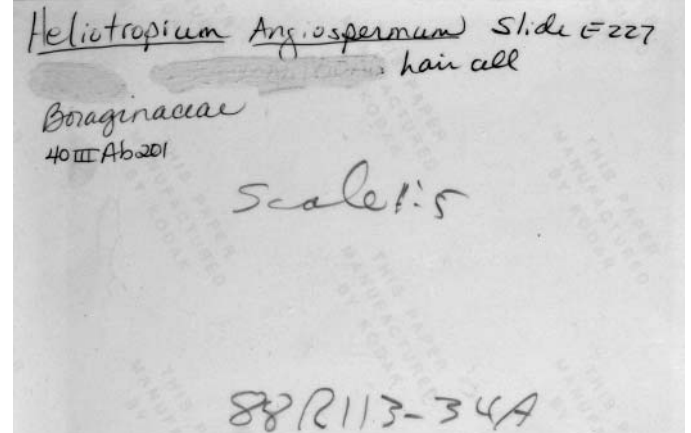
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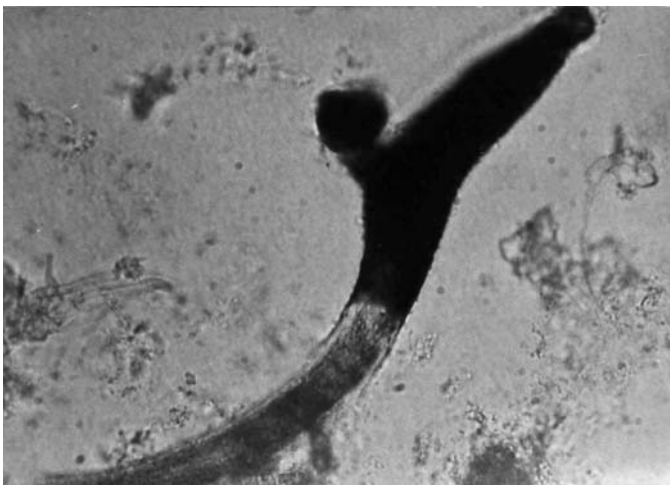
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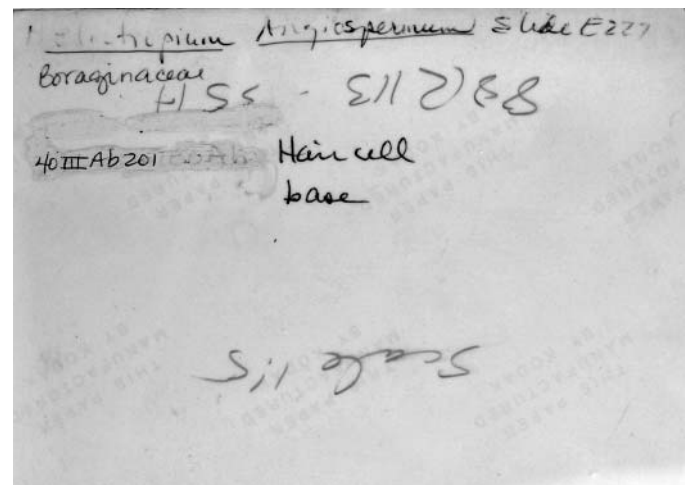
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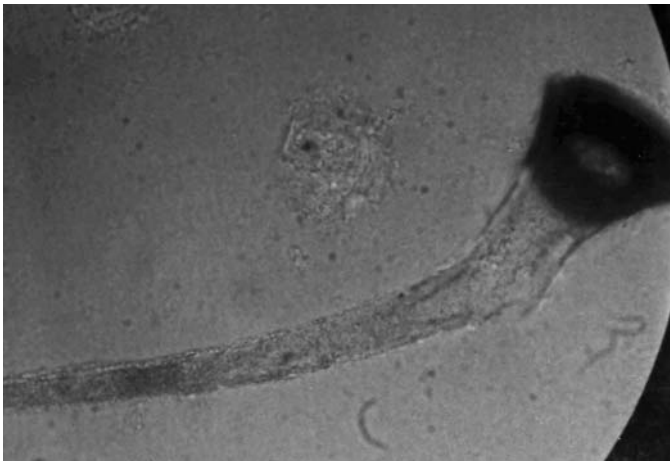
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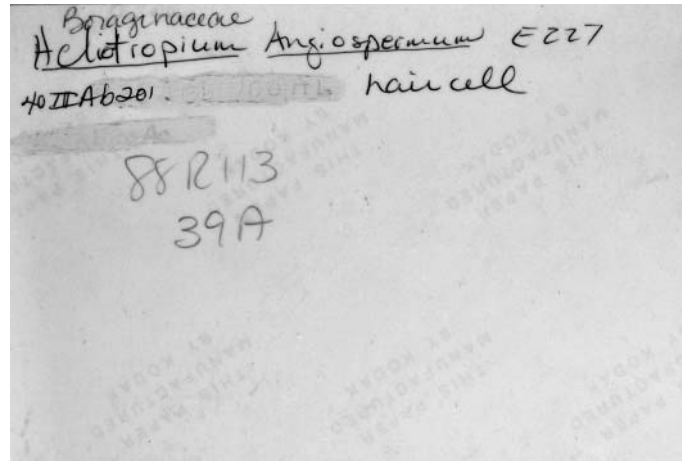
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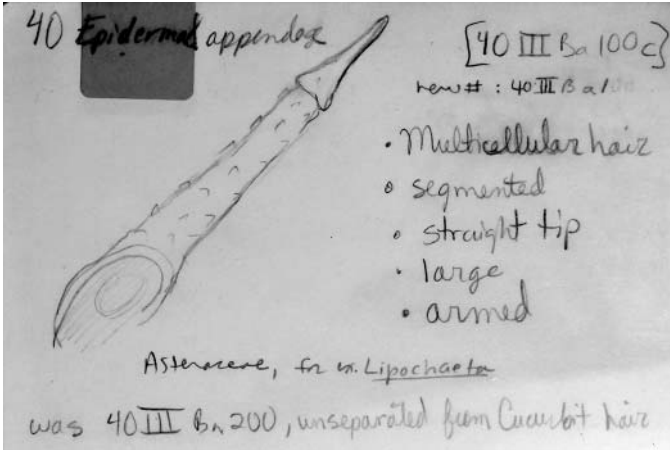
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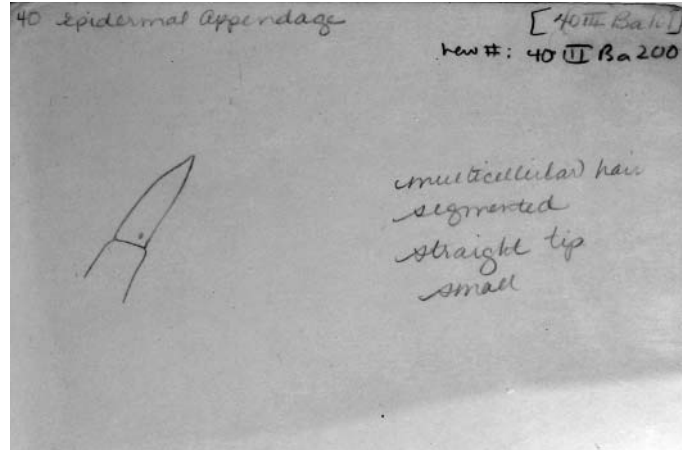
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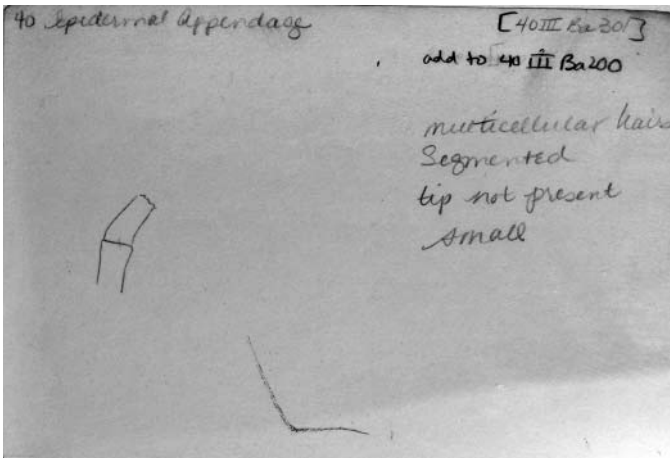
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40III Ba1 card 1.JPG



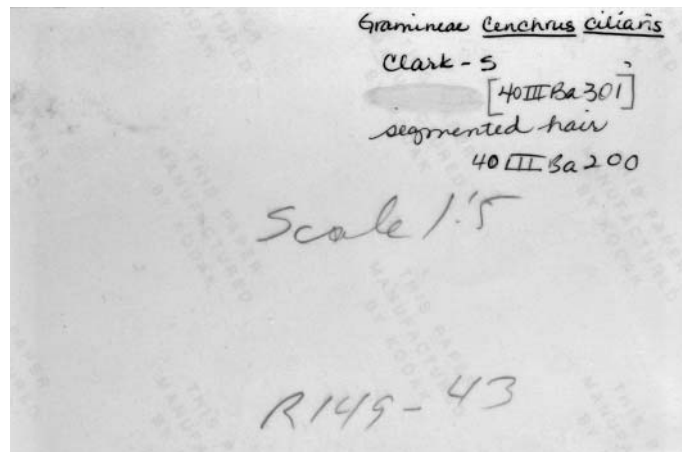
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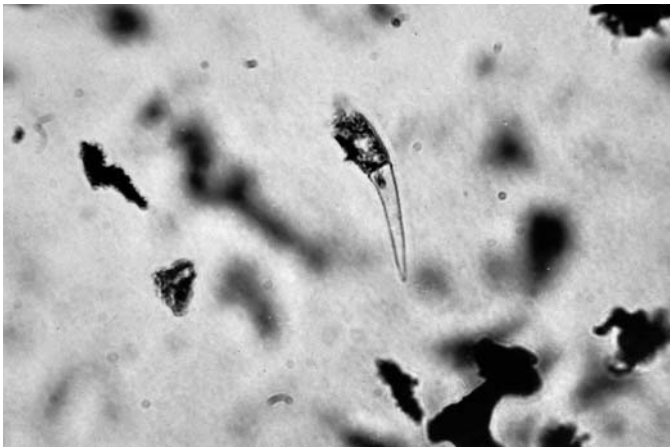
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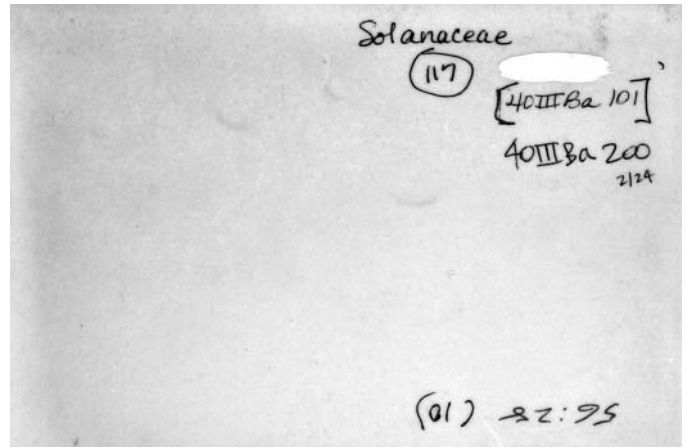
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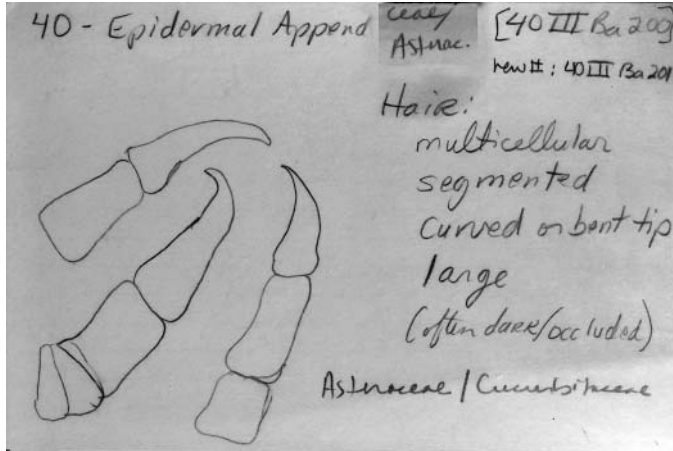
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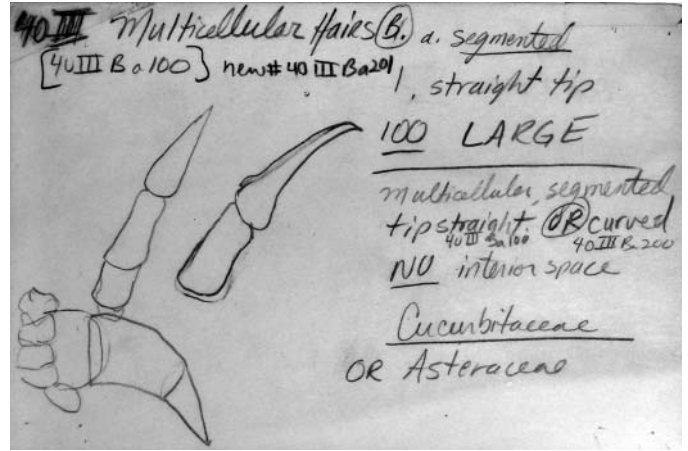
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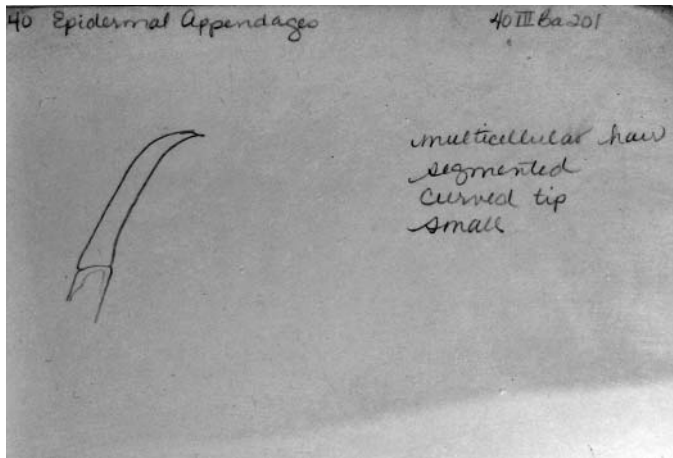
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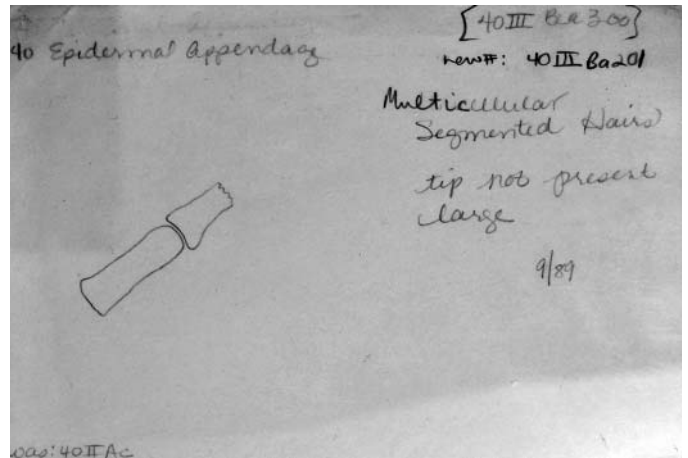
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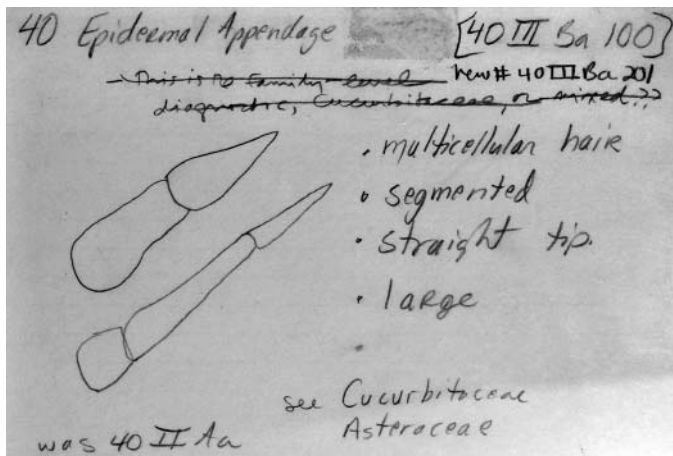
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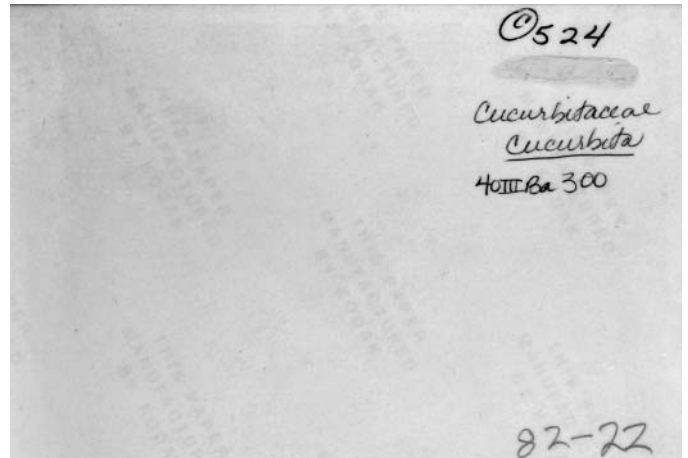
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40III Ba201 card 5.JPG



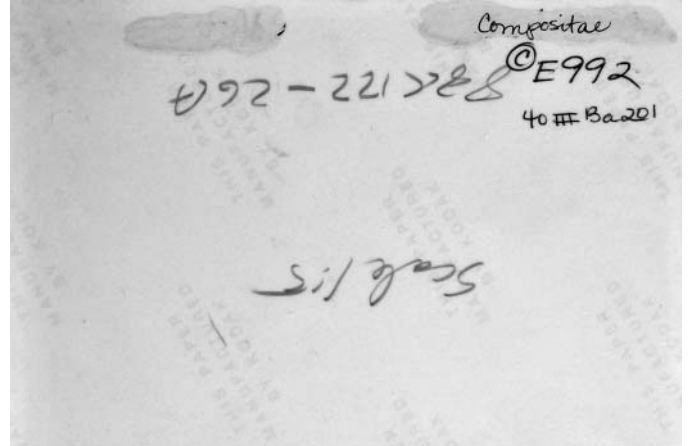
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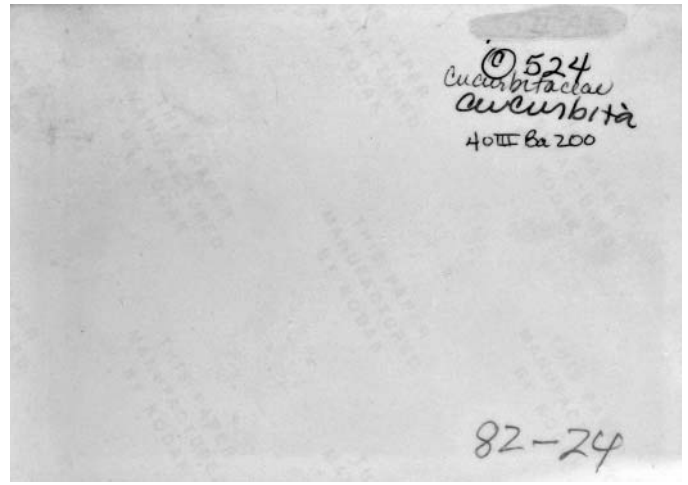
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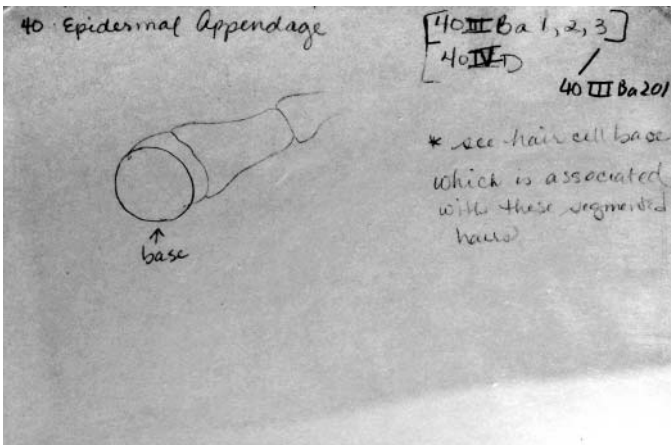
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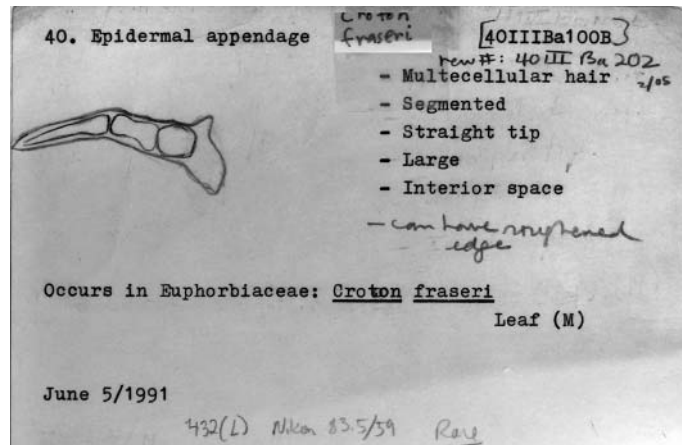
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40III Ba201 photo 3b.JPG



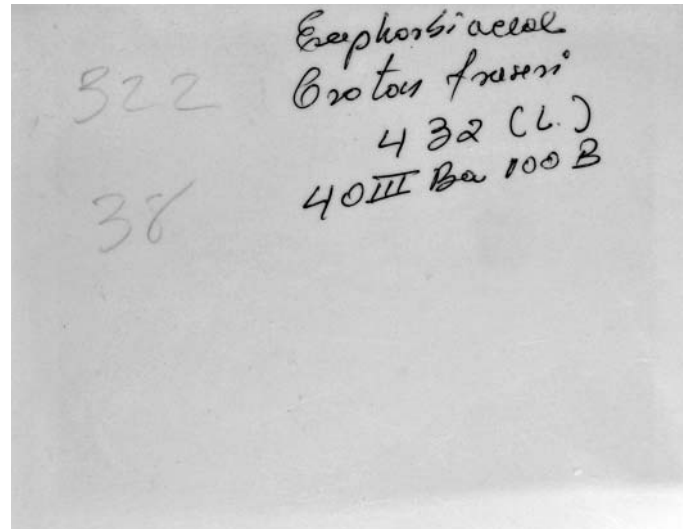
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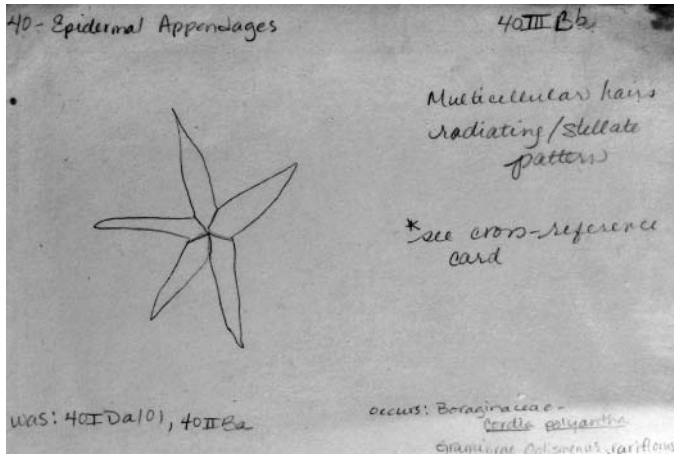
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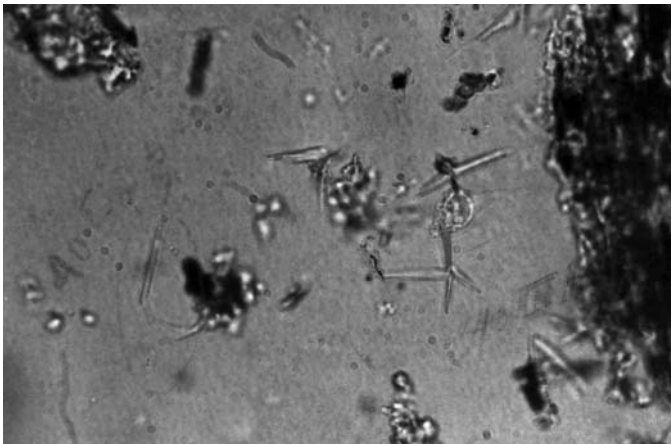
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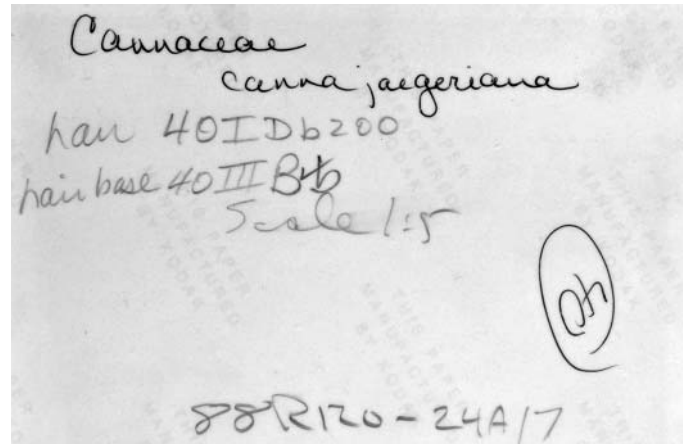
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40IIIBb card 1.JPG



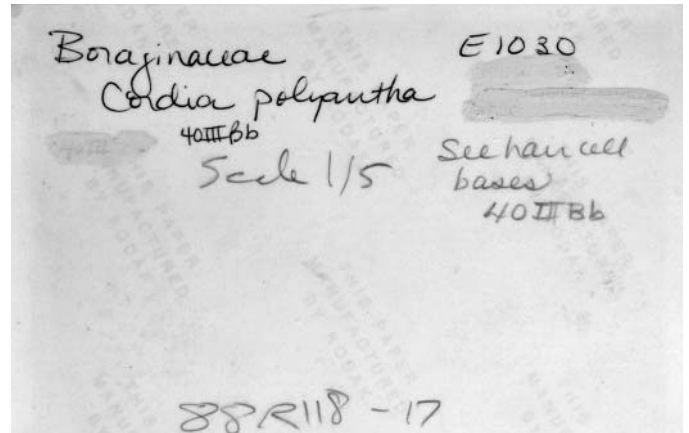
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40IIIBb photo 1b.JPG



40IIIBb photo 2f.JPG



40IIIBb photo 2b.JPG