



Association of Public Analysts

Photomicrographs

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FOREWORD

I have great pleasure in introducing this guide for use as a training and learning tool while carrying out study for the MChemA. Microscopy is an integral part of the syllabus and it was felt that the following photomicrographs might help candidates during their studies and preparing for the Part C examination.

It is hoped that these photomicrographs will supplement candidates own microscopy work during their study for the MChemA. During the course of the qualification, candidates will be expected to identify structures within foods and to also identify foods within mixtures using microscopical techniques. The key to this is to recognise specific structures which are associated with particular foodstuffs and the following photomicrographs attempt to point out some of those structures and characteristics.

Candidates should ensure that they gain as much experience of microscopy as possible in their own laboratory during the course of their studies and familiarise themselves with as many microscopical techniques as possible.

Jon Griffin
Training Committee Chair
Association of Public Analysts
2015

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- Maize starch
- Oat starch
- Wheat starch

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- Domestic oven insulation
- Flax
- Jute
- Mixture of synthetic and natural fibres
- Rodent hair

Minerals & Dusts

- Kielselguhr

Moulds

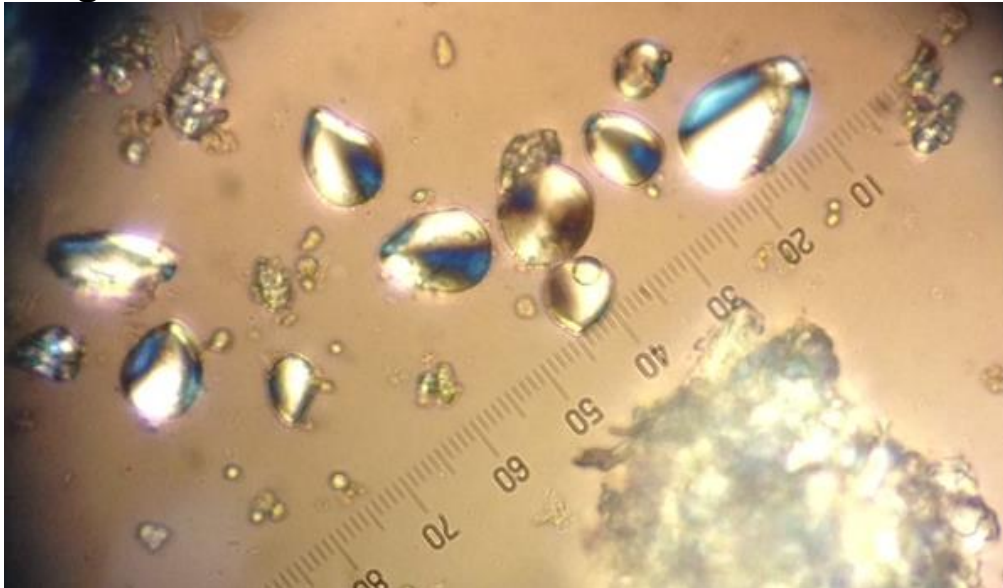
- Alternaria
- Aspergillus
- Botrytis
- Byssochlamys fulva
- Geotrichum candida
- Mucor
- Penicillium
- Rhizopus
- Fungal sclerotium

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- "Edible" Glitter
- Fish scale
- Meat - Muscle fibres
- Collagen, elastic, fibroblasts
- Pea protein
- Pollen - Chamomile
- Elderflower
- Pine
- Yeast

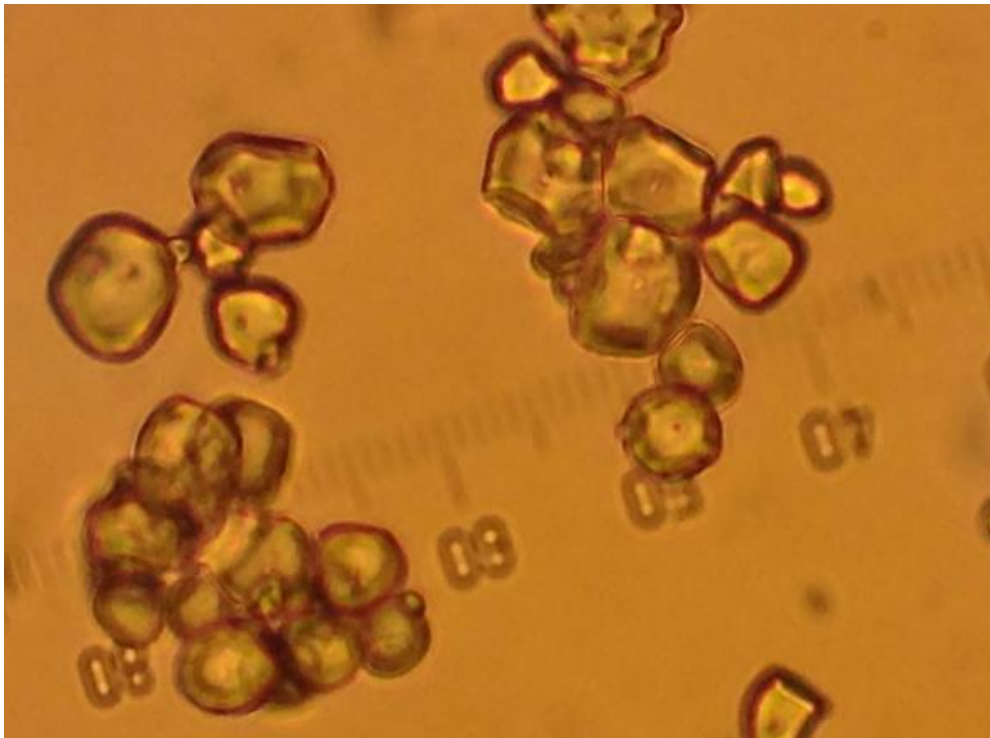
Starches

Ginger starch



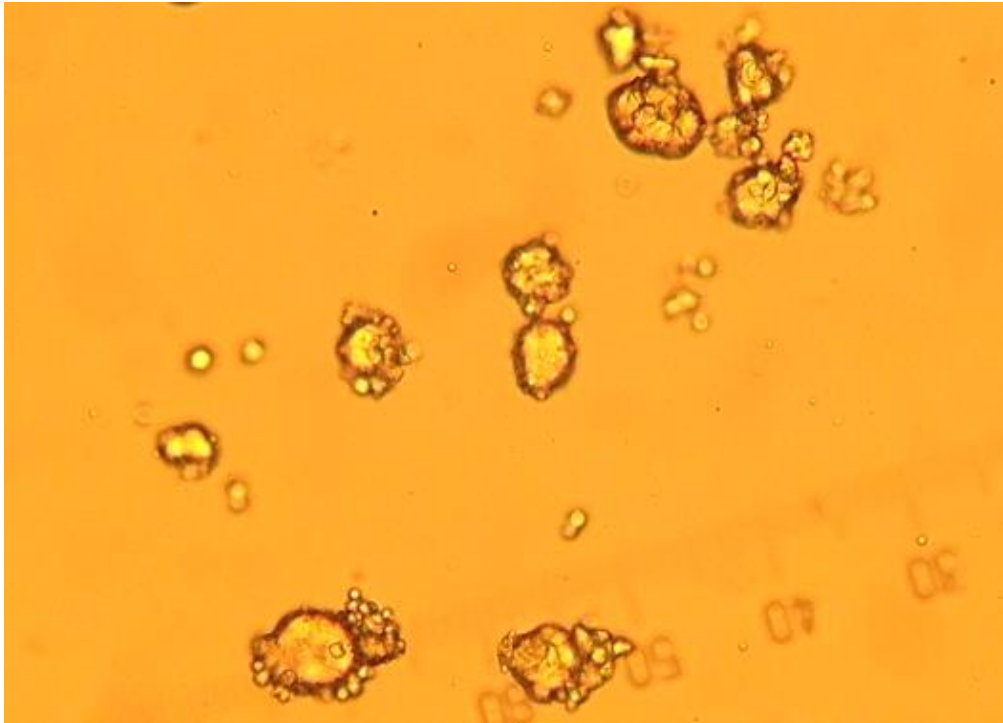
400x, cross polarised light.
"Maltese cross", hilum at narrow end.

Maize starch



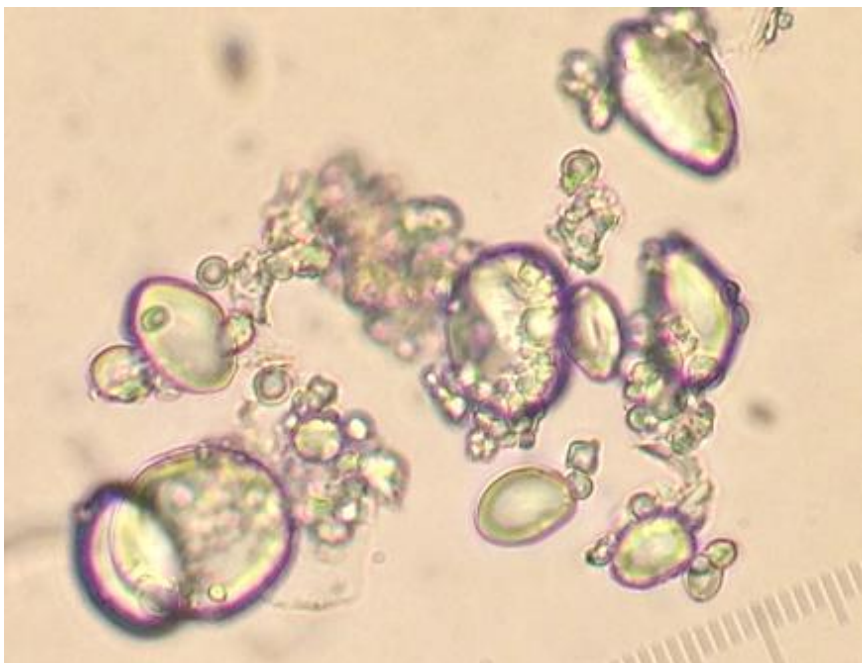
400x
Polyhedral, central hilum

Oat starch

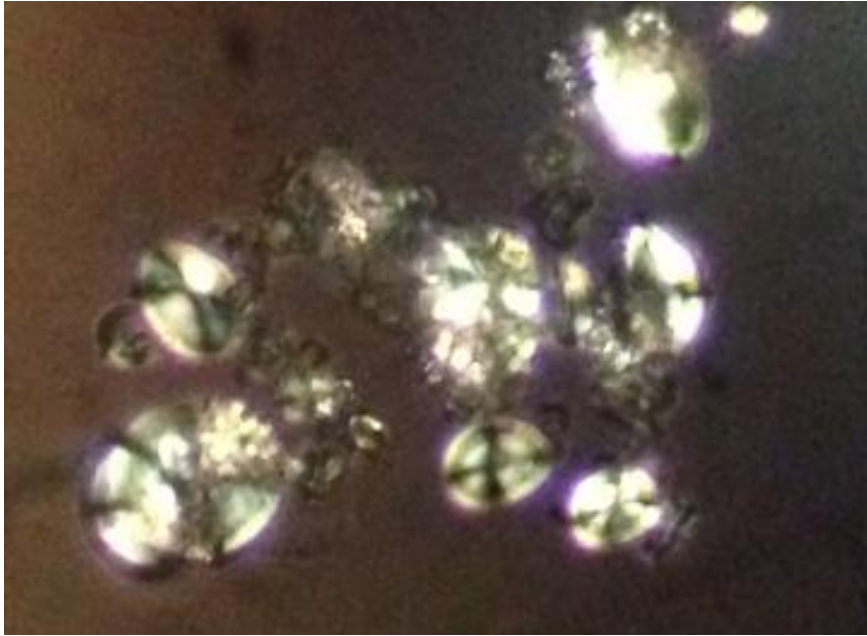


400x
Simple, occur in clumps.

Wheat starch



400x
Central hilum visible as a line, faint striations, two distinct sizes.



400x, cross polarised light.
"Maltese cross."

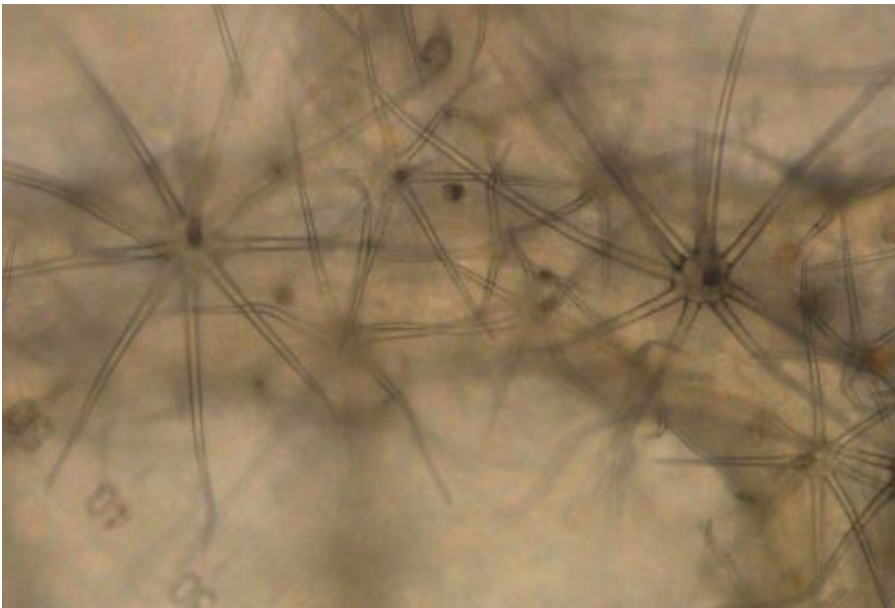
Leaves & Grasses

Basil



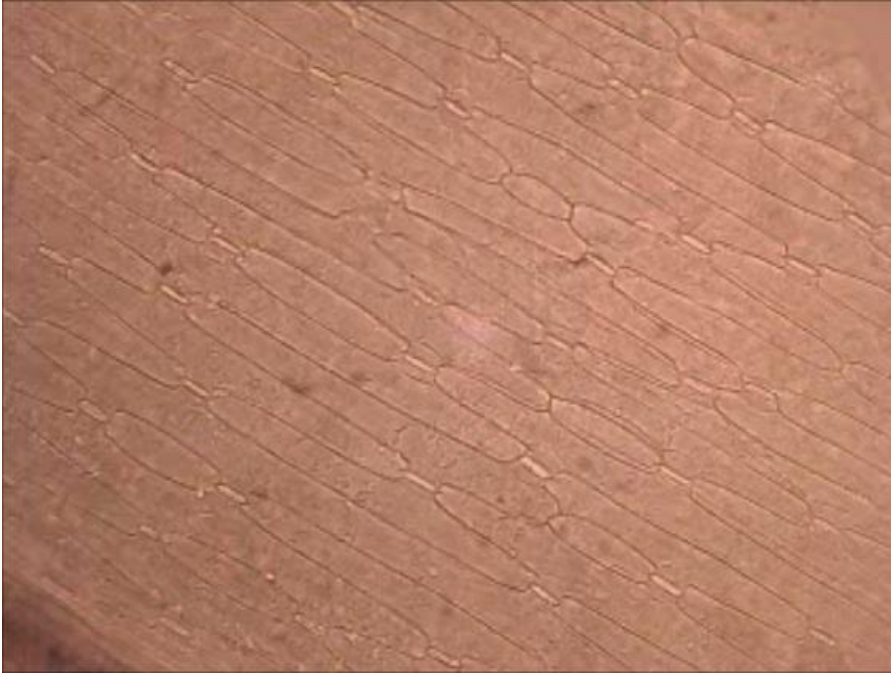
Trichomes

Cistus

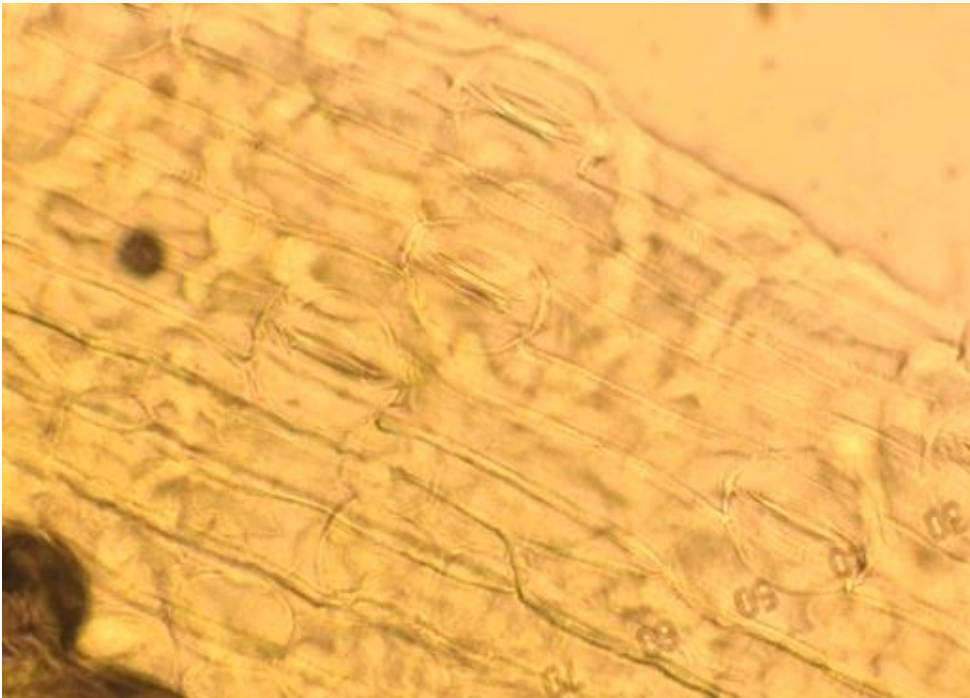


400x
Stellate trichomes.

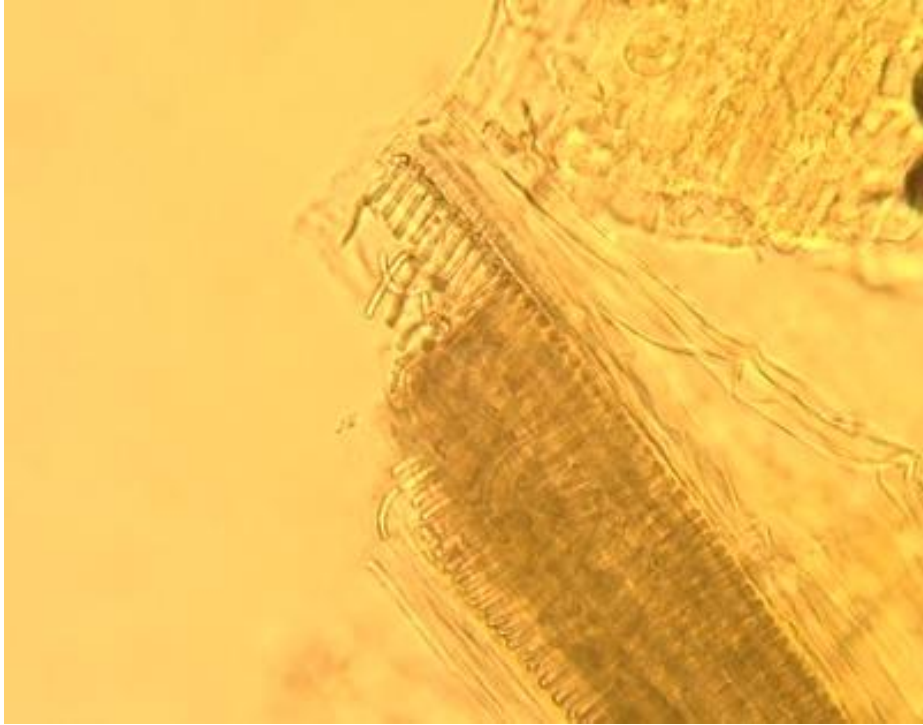
Chives



Elongated epidermal cells and stomata.

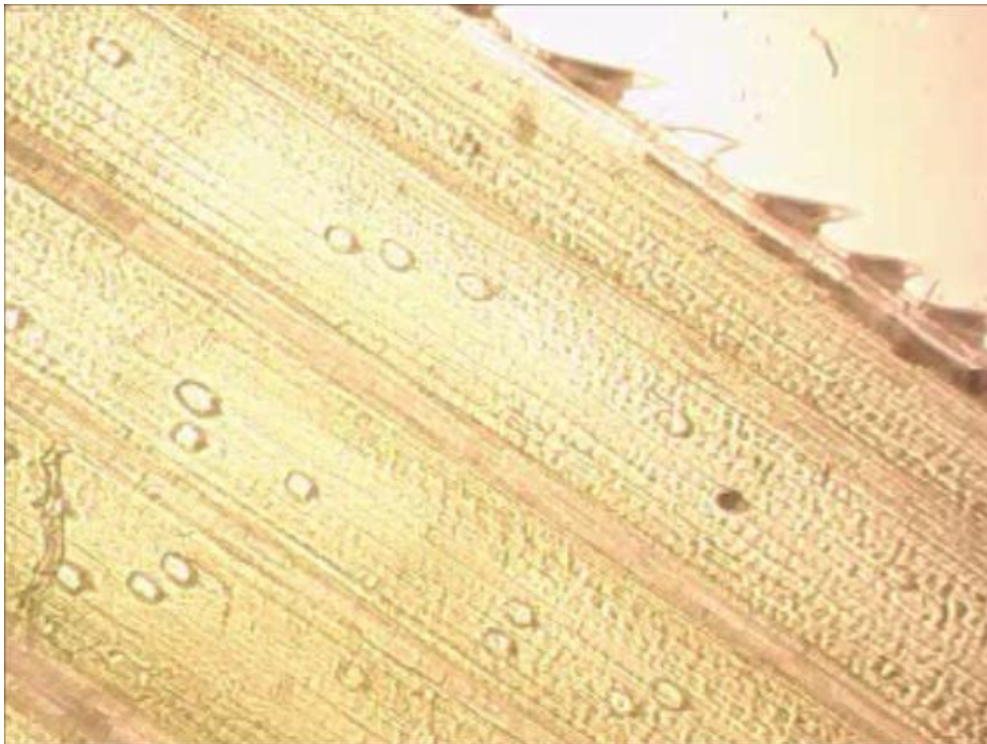


400x
Stomata



250x
Xylem

Grass



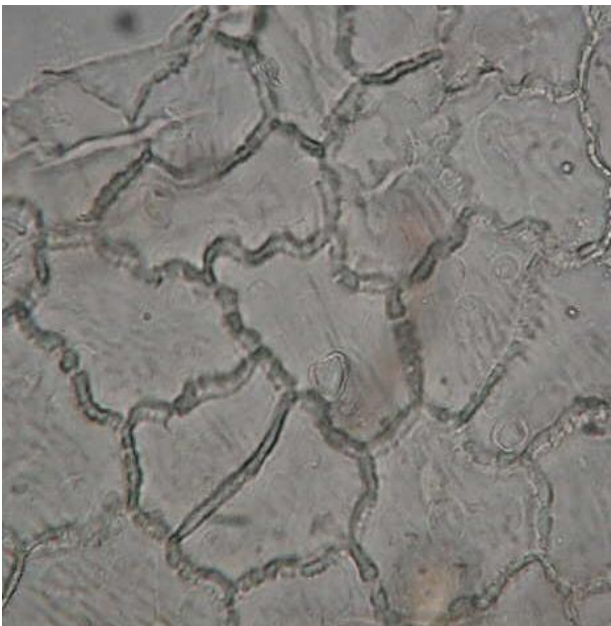
Smaller surface trichomes

Marjoram



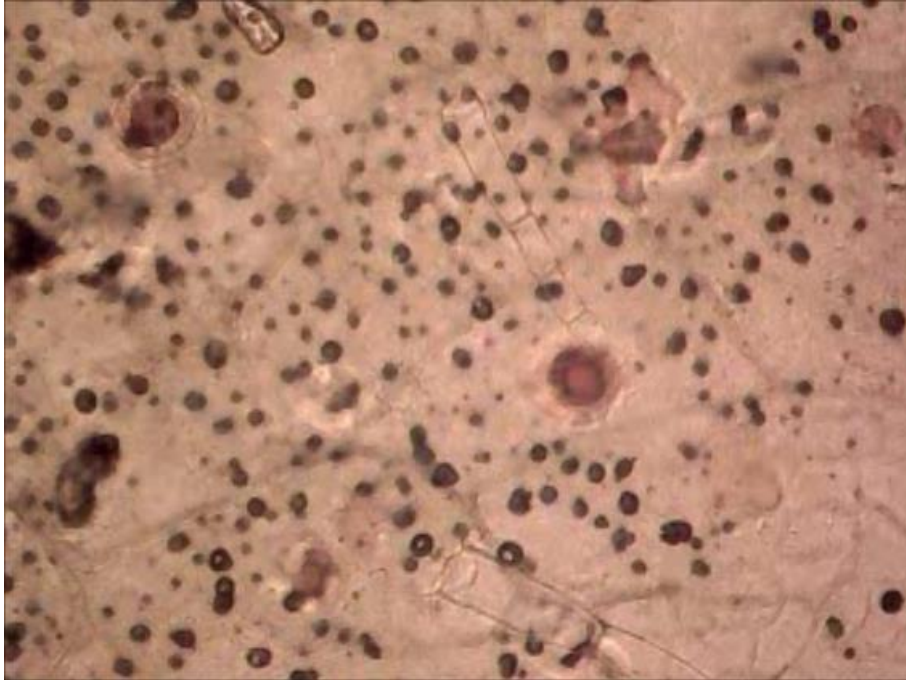
Oil glands.

Mint



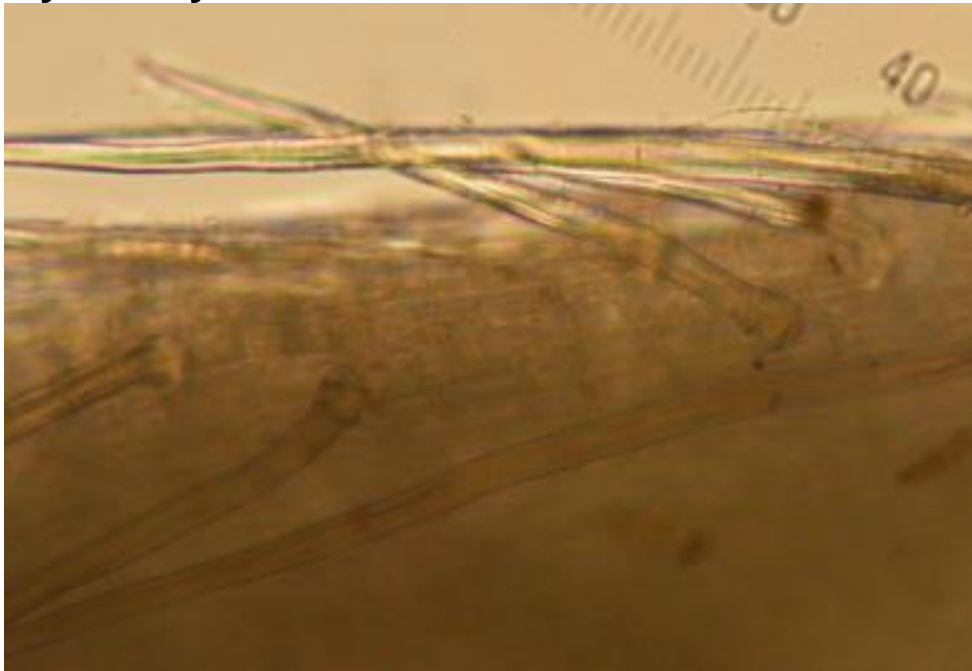
400x

Epidermal cells near leaf margin showing distinct "beading".



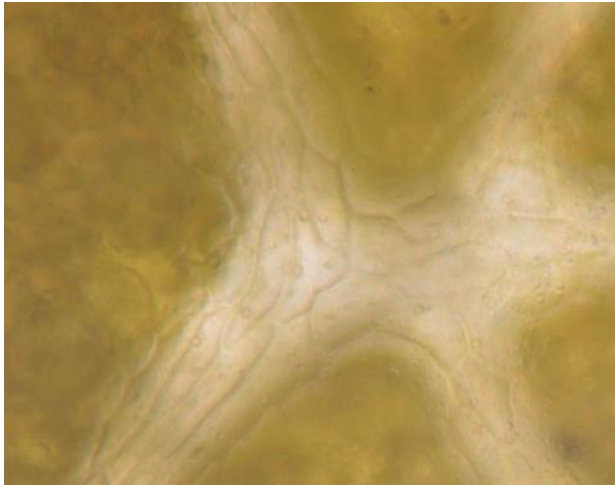
Epidermis showing oil cells and trichomes

Myrtle/ Myrtus

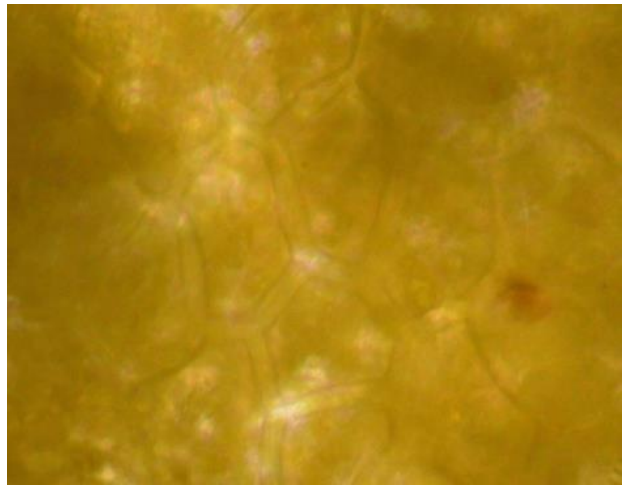


250x
Long, unicelled covering trichomes.

Olive vine leaf

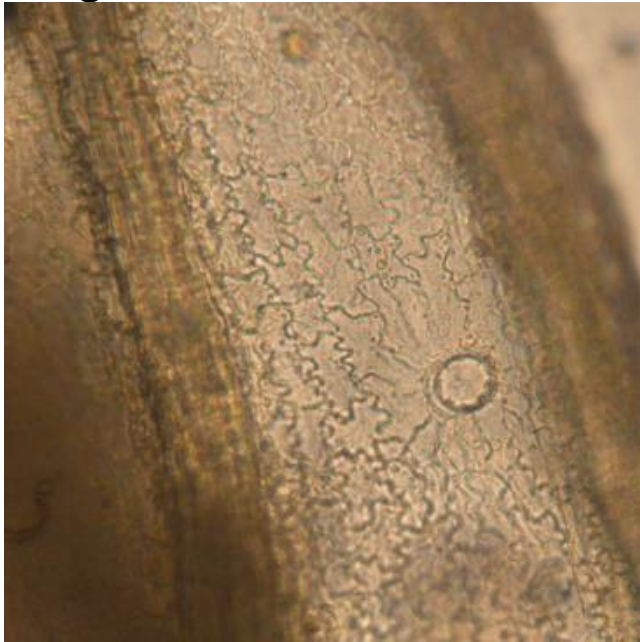


250x



400x
Epidermal cells.

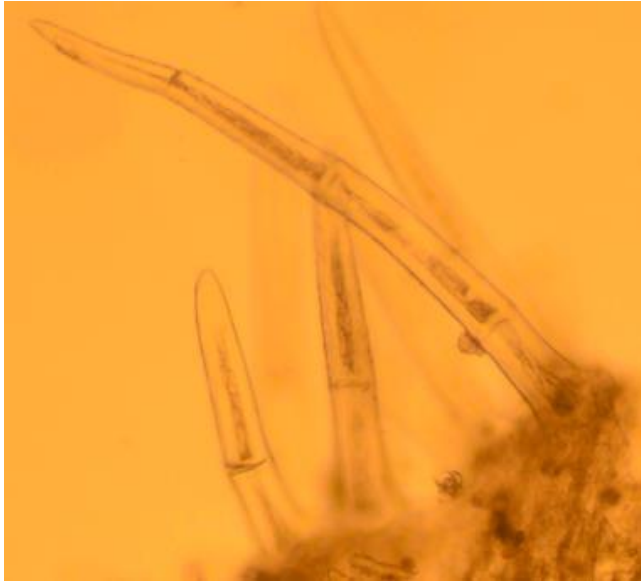
Oregano



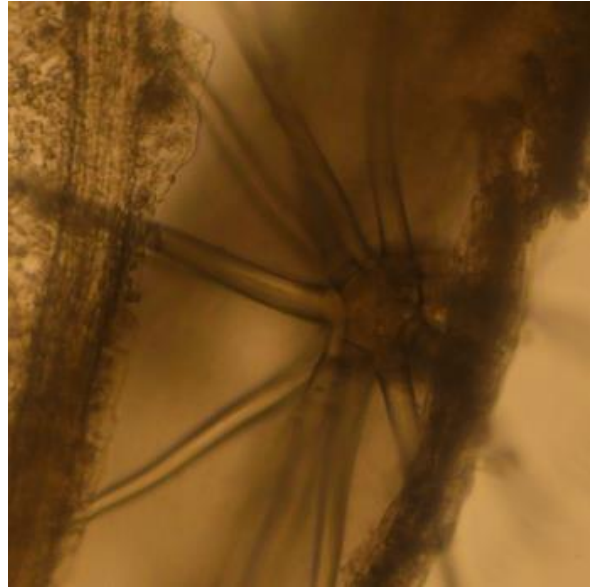
250x
Epidermis



250x
Multi-cellular glandular trichomes, side view.



250x
Multi-celled covering trichomes.



250x
Stellate trichome.



400x
Capitate glands.

Parsley



400x
"Crazy paving" like epidermal cells and stomata.

Rosemary

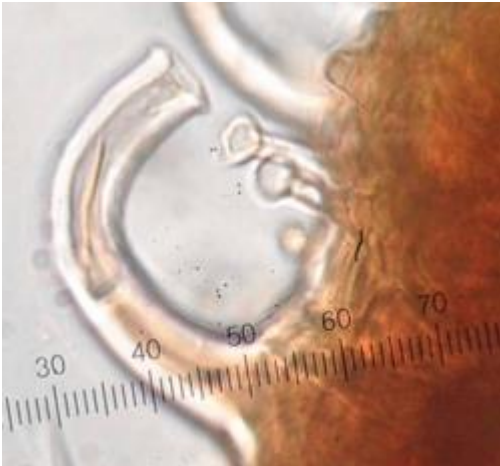


Branched trichomes.

Sage



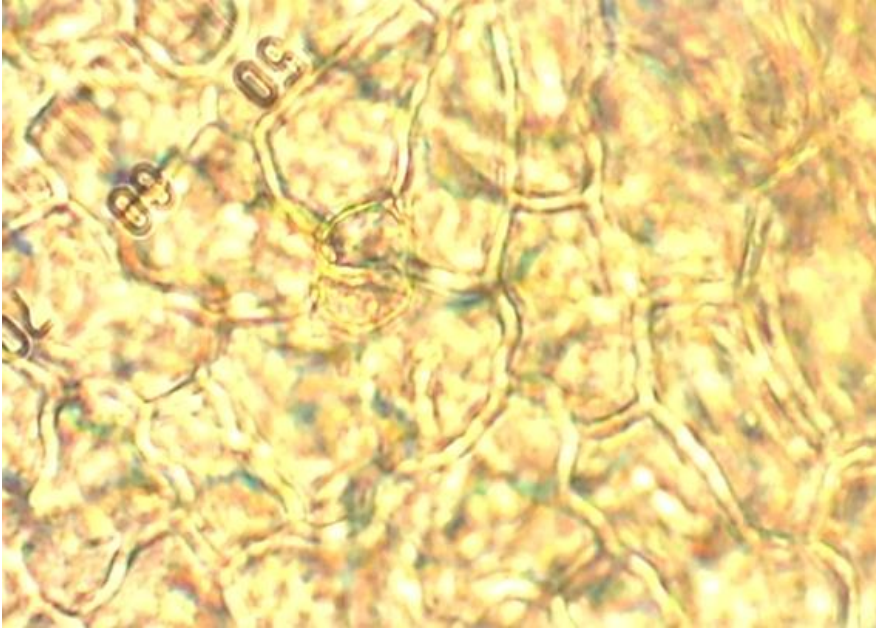
Elongated trichomes.



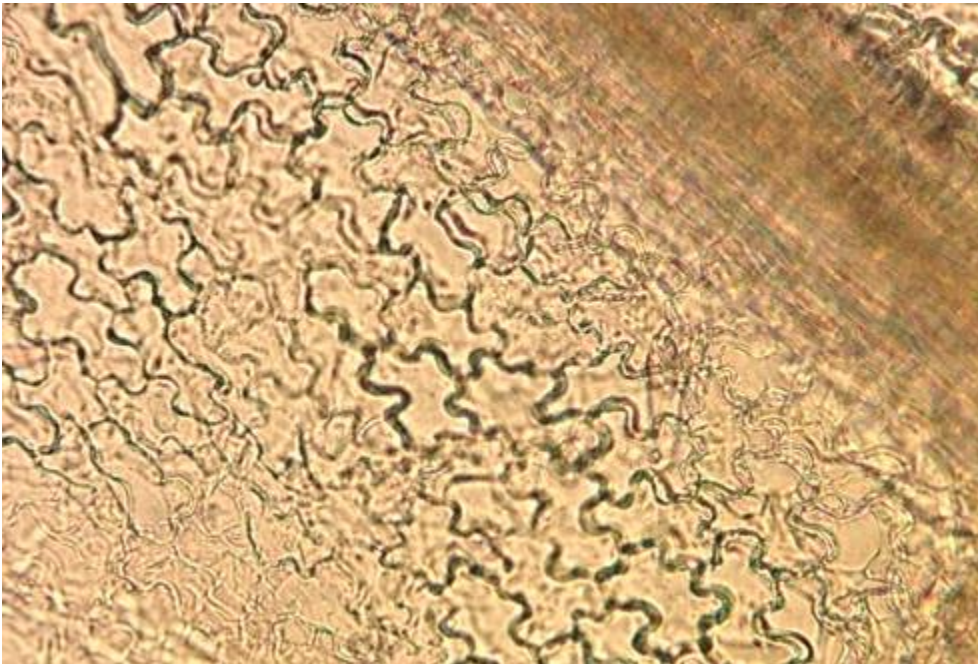
400x
Glandular trichomes.

Flowers & Flowering Tops

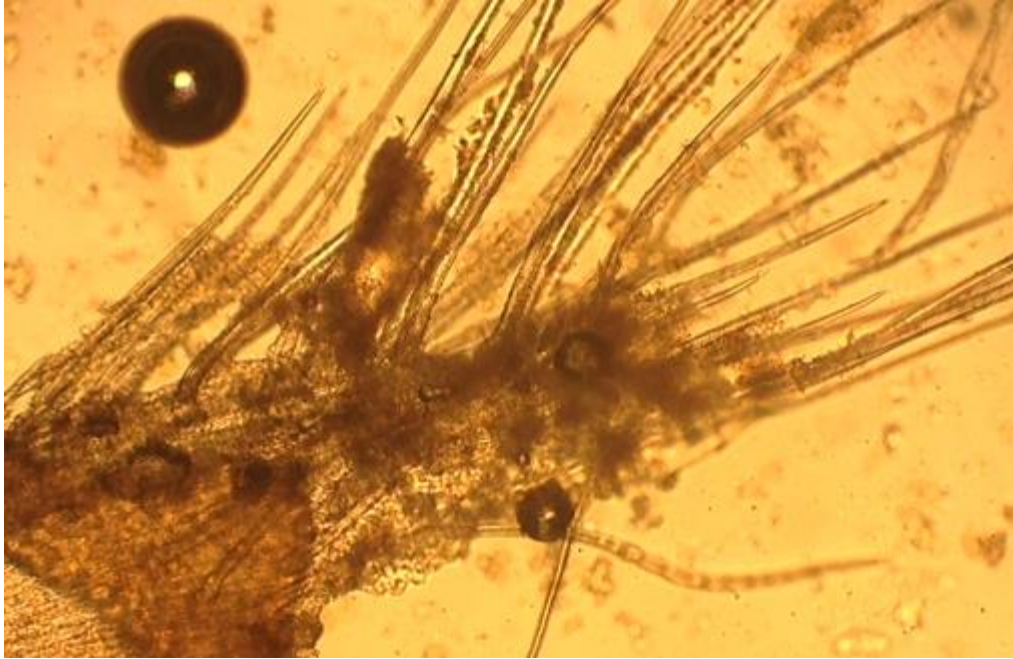
Hops



400x
Anomocytic stoma.



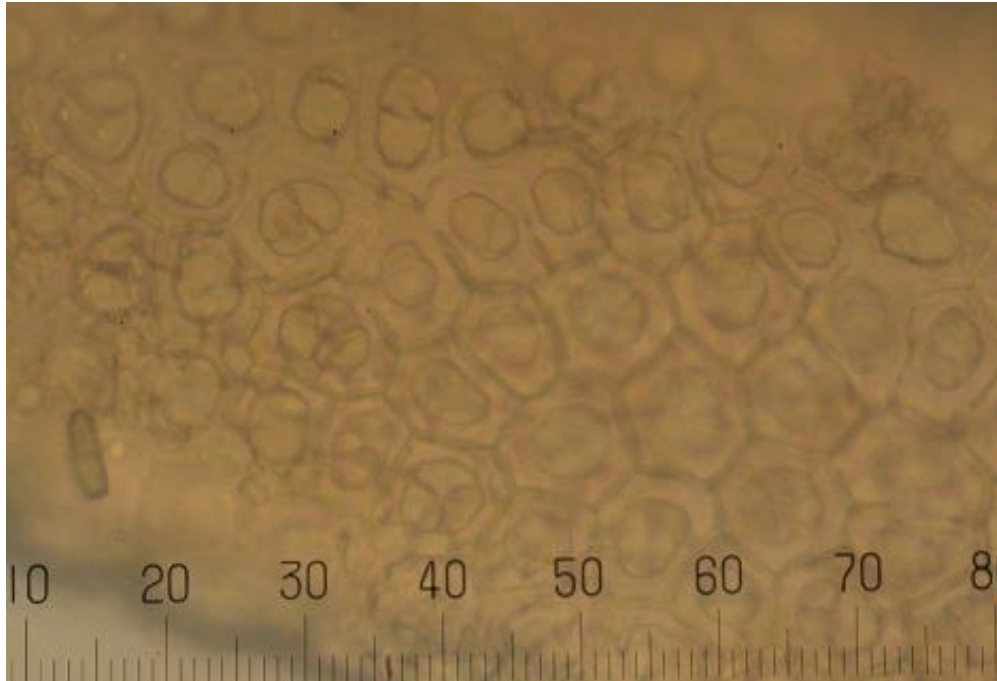
250x
Epidermal cells "crazy paving".



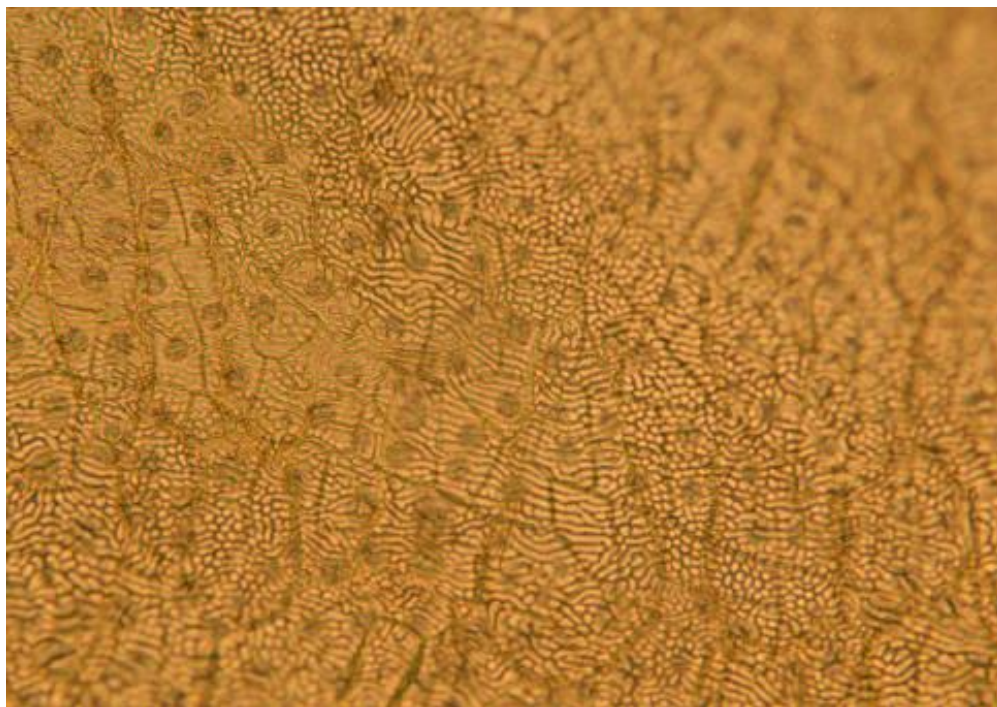
100x
Elongated surface trichomes

Fruits, Seeds & Nuts

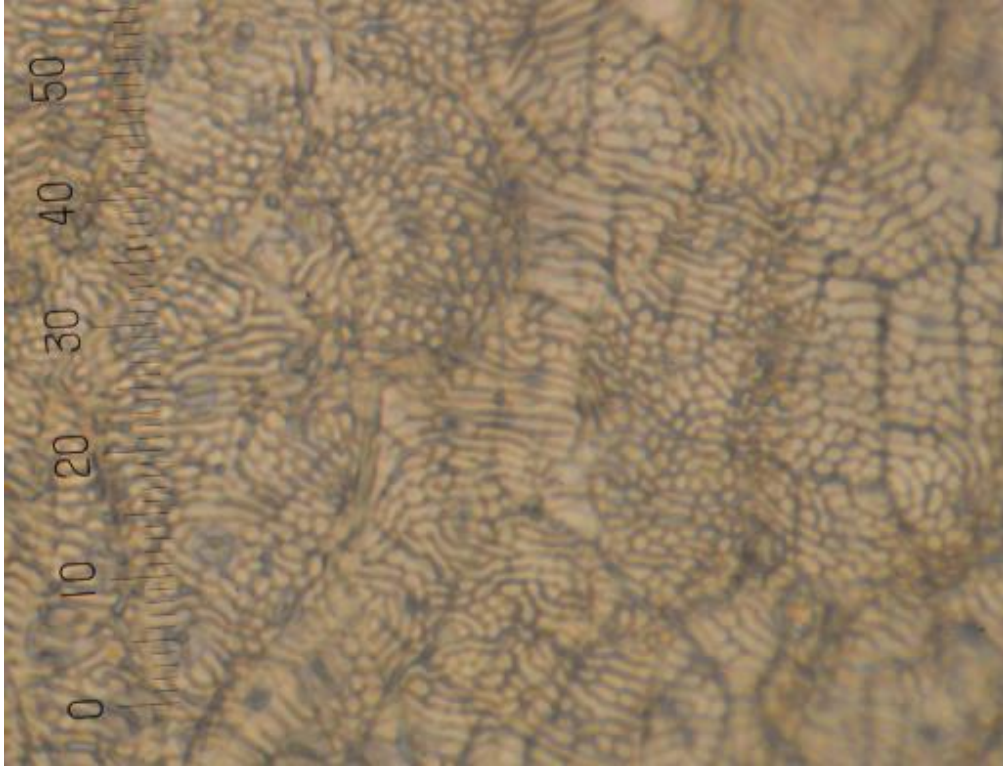
Chia



400x
Palisade cells.



250x



400x

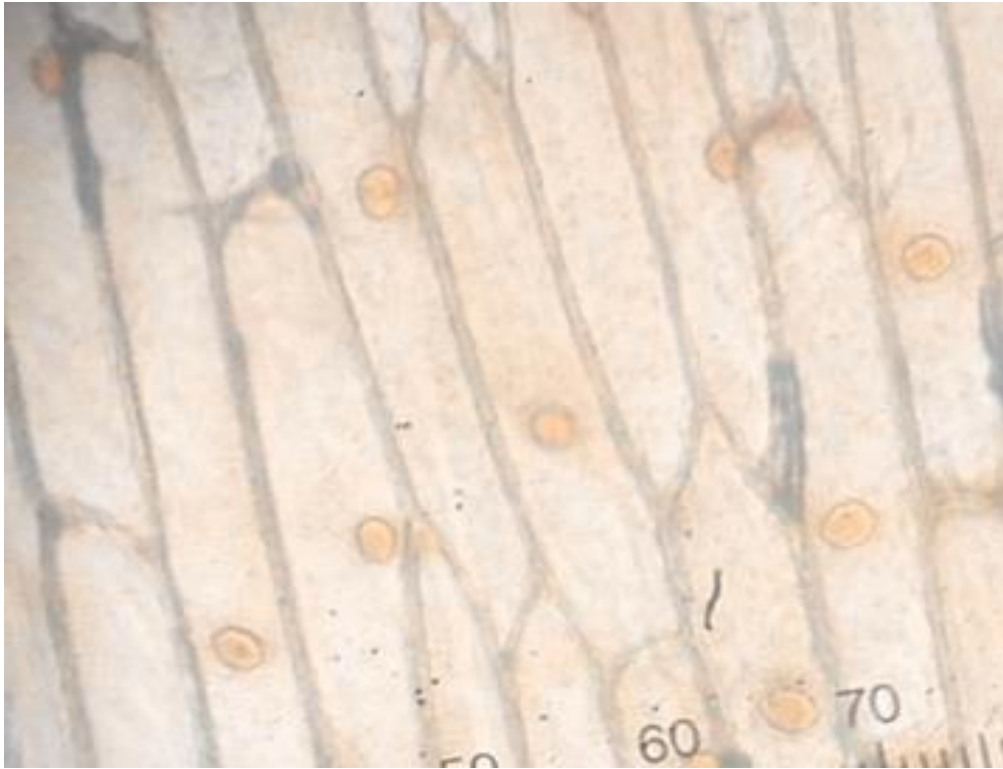
Coriander seed



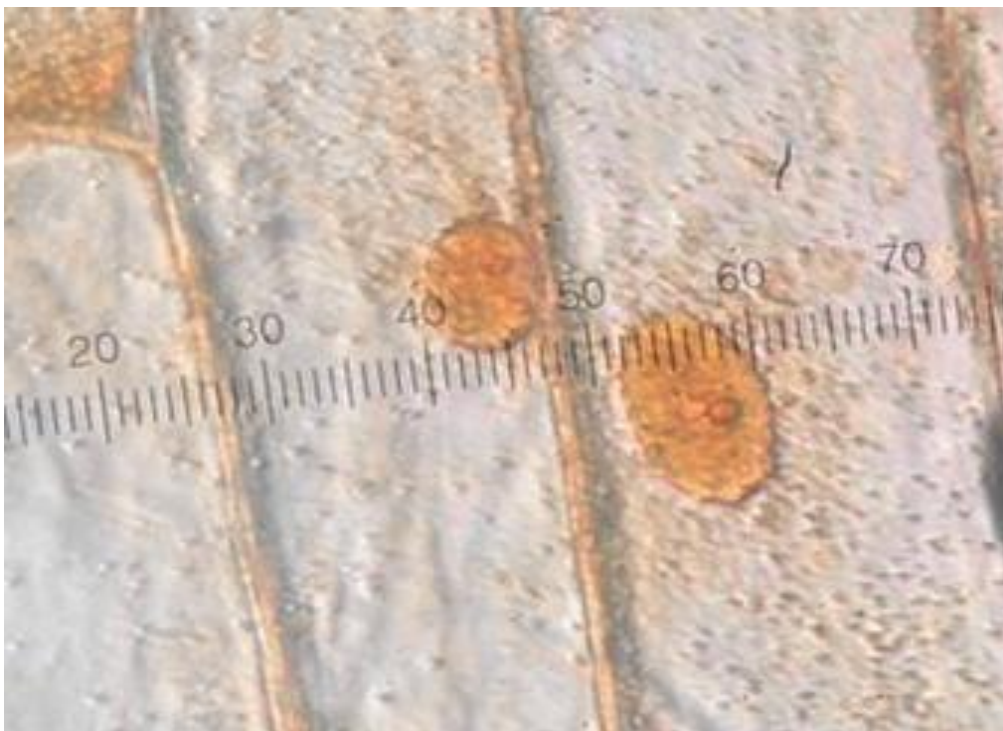
400x

Rectangular sclereids of the mesocarp with underlying endocarp.

Onion skin

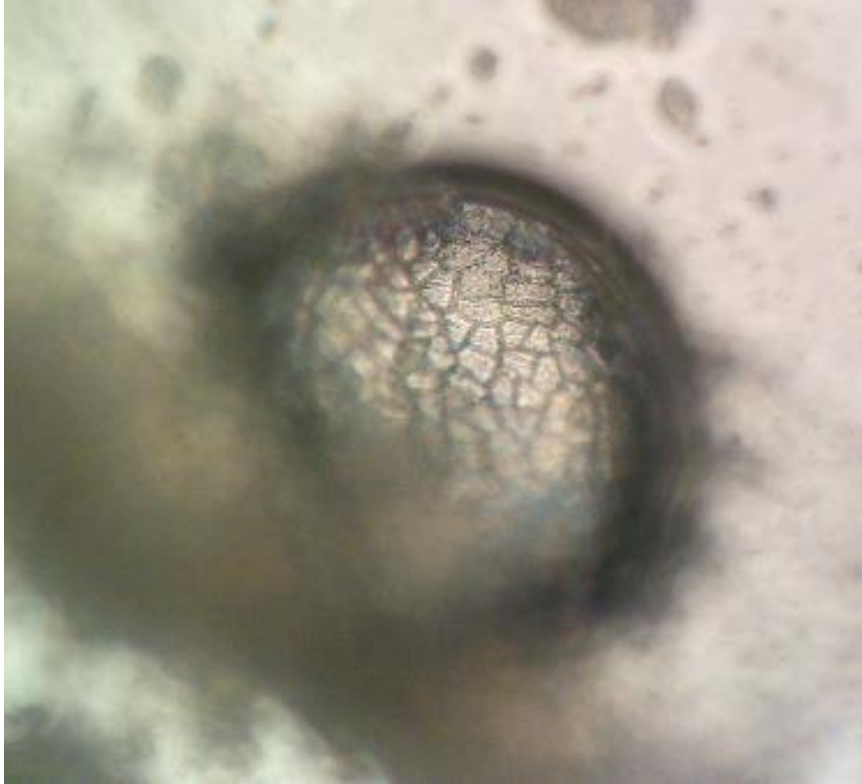


100x, iodine stain.
Epidermal cells and nuclei.

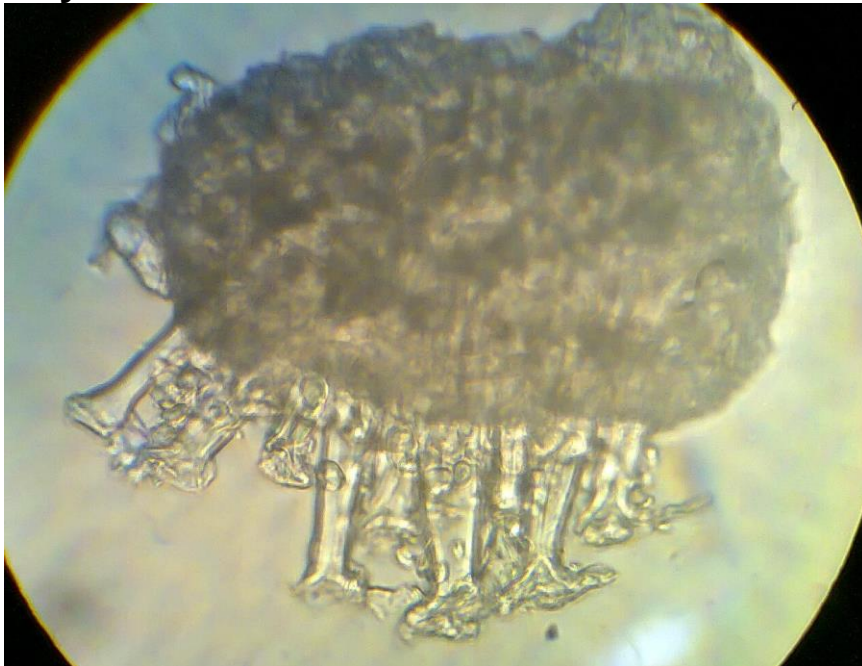


400x, iodine stain.
Epidermal cells, nuclei and nucleoli.

Quinoa seed



Soya



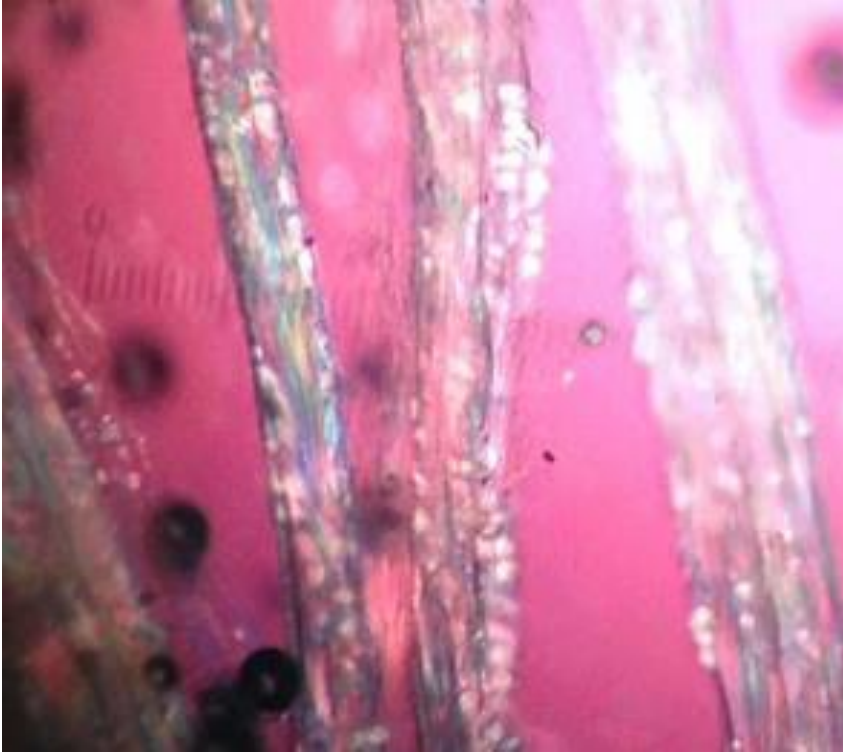
"Hour glass" cells

Sumach/ Sumac



Roots and Rhizomes

Liquorice root

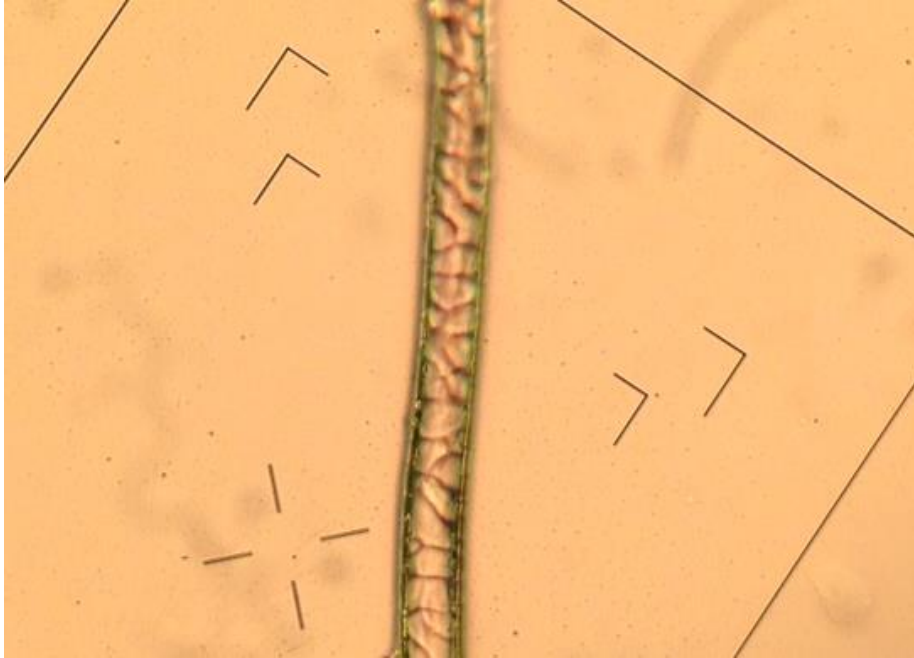


400x

Calcium oxalate crystals under cross polarised light.

Fibres & Hairs

Cashmere fibre



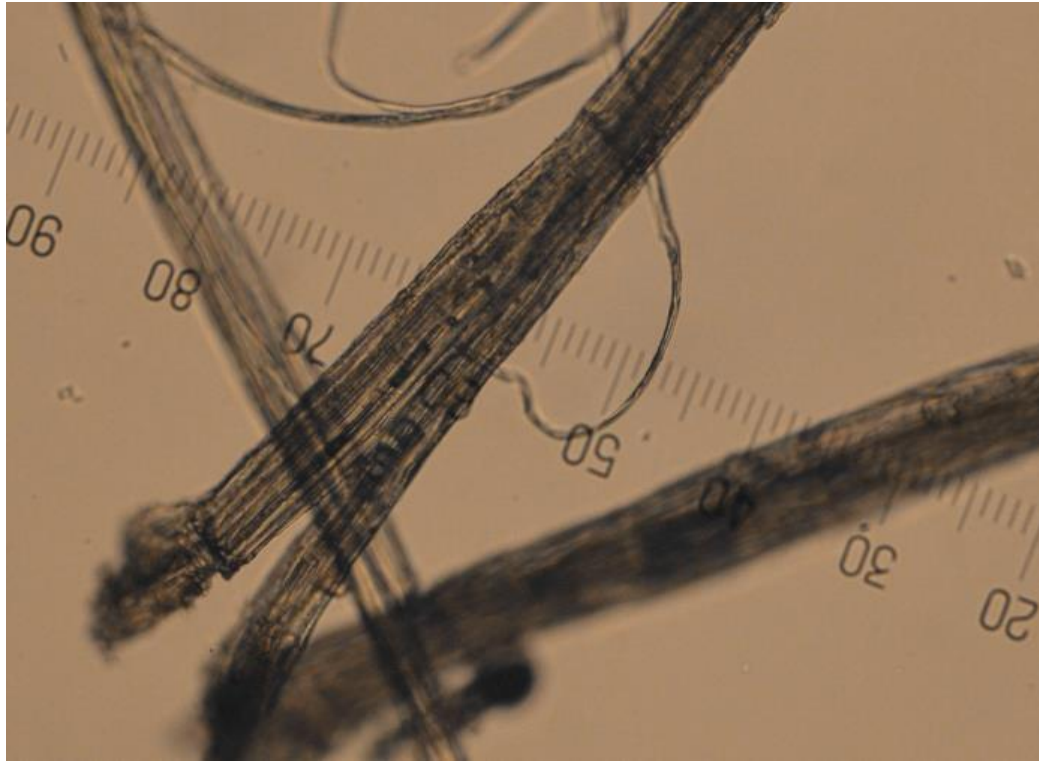
400x
Irregular wavy mosaic scale pattern.

Domestic oven insulation

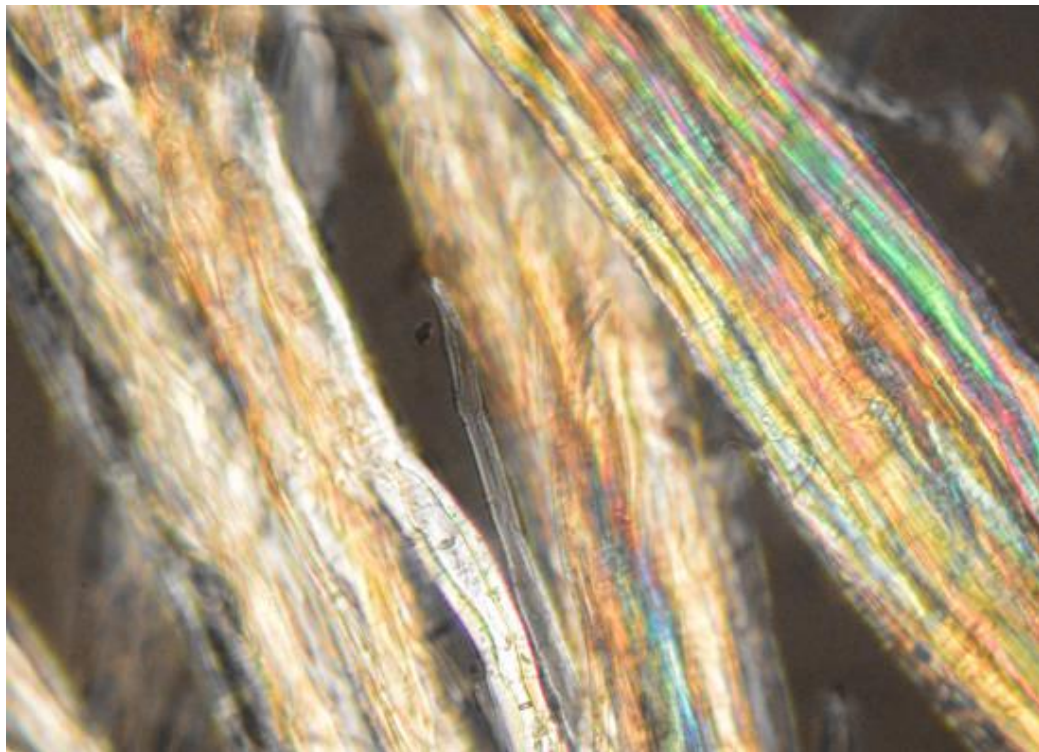


250x

Flax



250x



250x
Cross-polarised light.

Jute



250x

Mixture of synthetic and natural fibres



250x

Natural: scale pattern, irregular colour distribution.

Synthetic: smooth surface, regular colour distribution.

Rodent hair

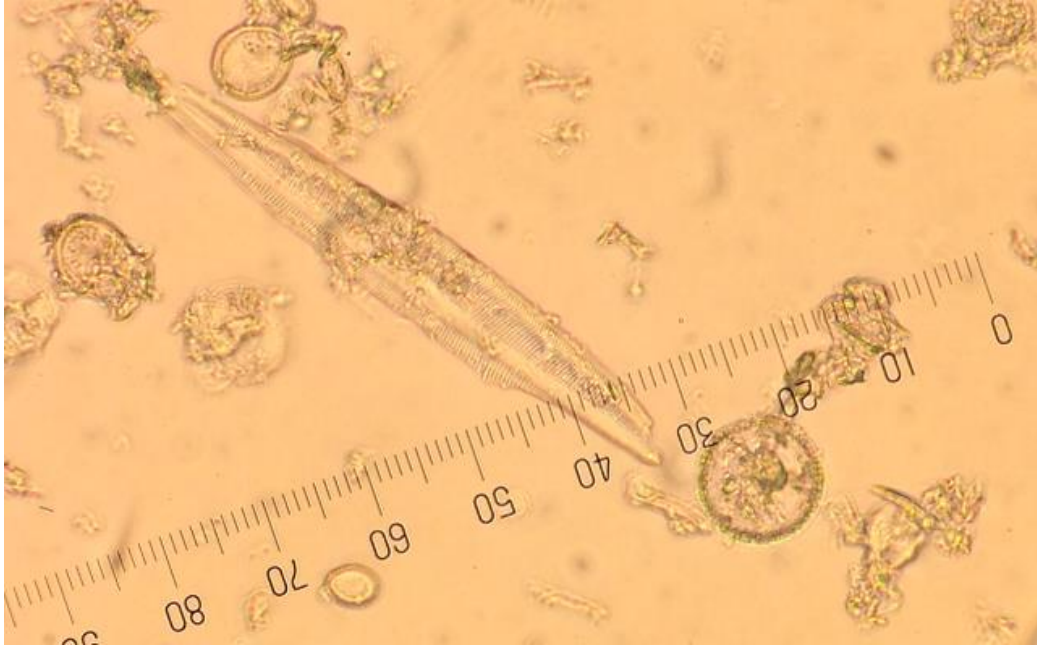


400x

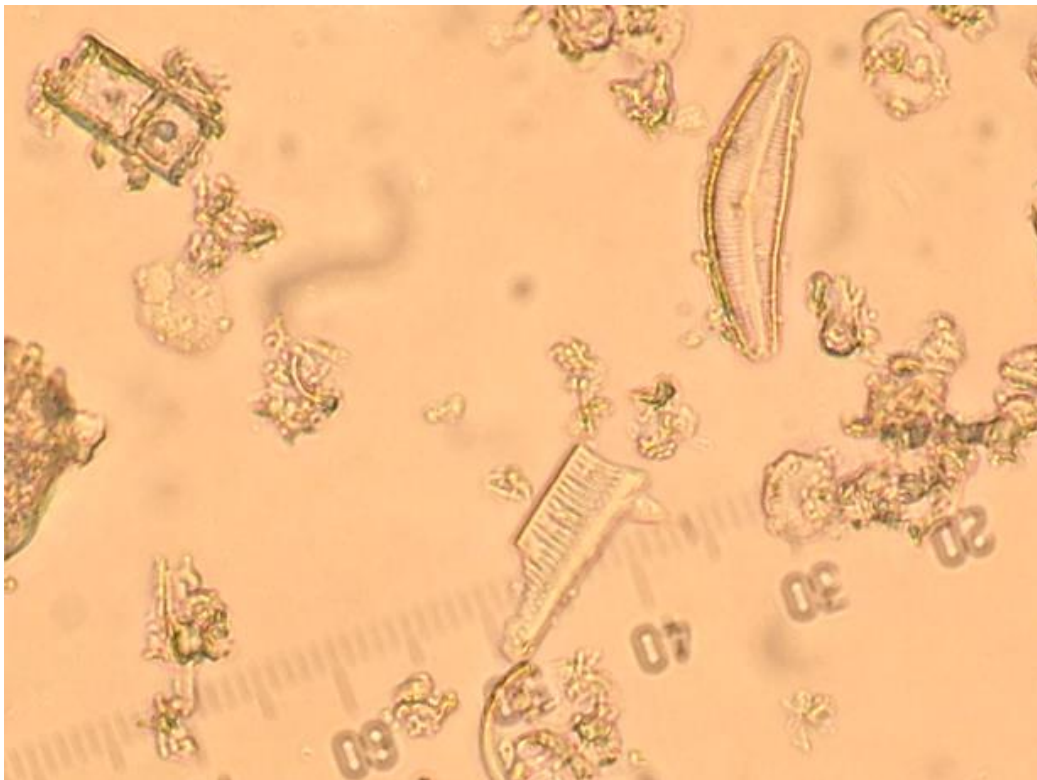
“Ladder-like” medulla.

Minerals & Dusts

Kieselguhr- Diatomaceous earth



400x
Fossilised remains of diatoms.



400x

Moulds

Alternaria



400x
Multicelled conidia.

Aspergillus



400x
Swollen vesicles, sterigmata and chains of conidia.

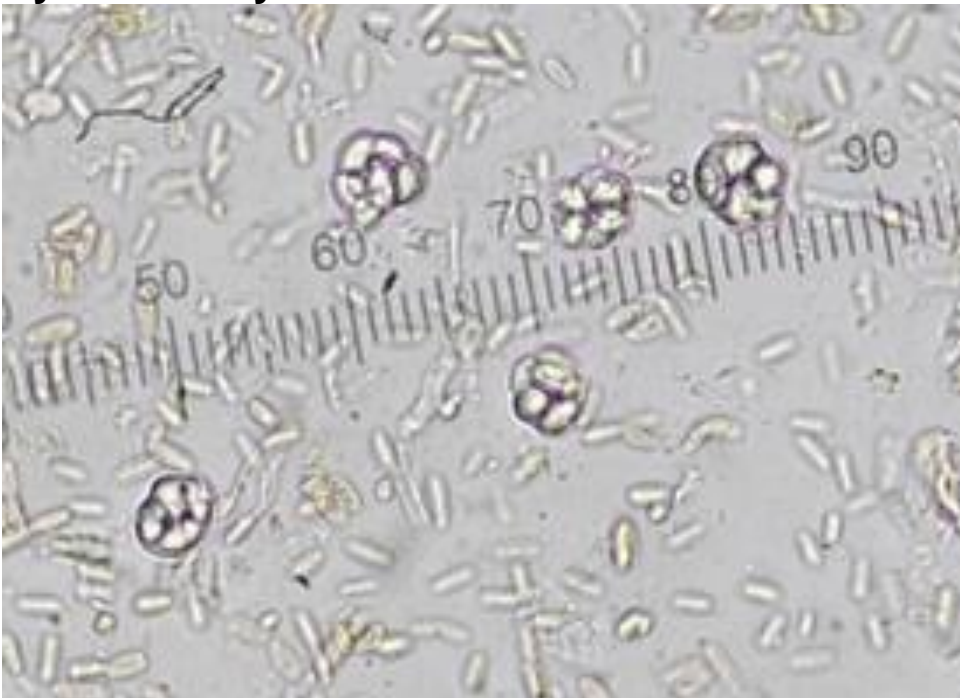
Botrytis (“Grey mould”)



400x

Branching, septate hyphae; spores on tree-like conidiophores

Byssochlamys fulva



400x

Asci

Geotrichum candida



400x

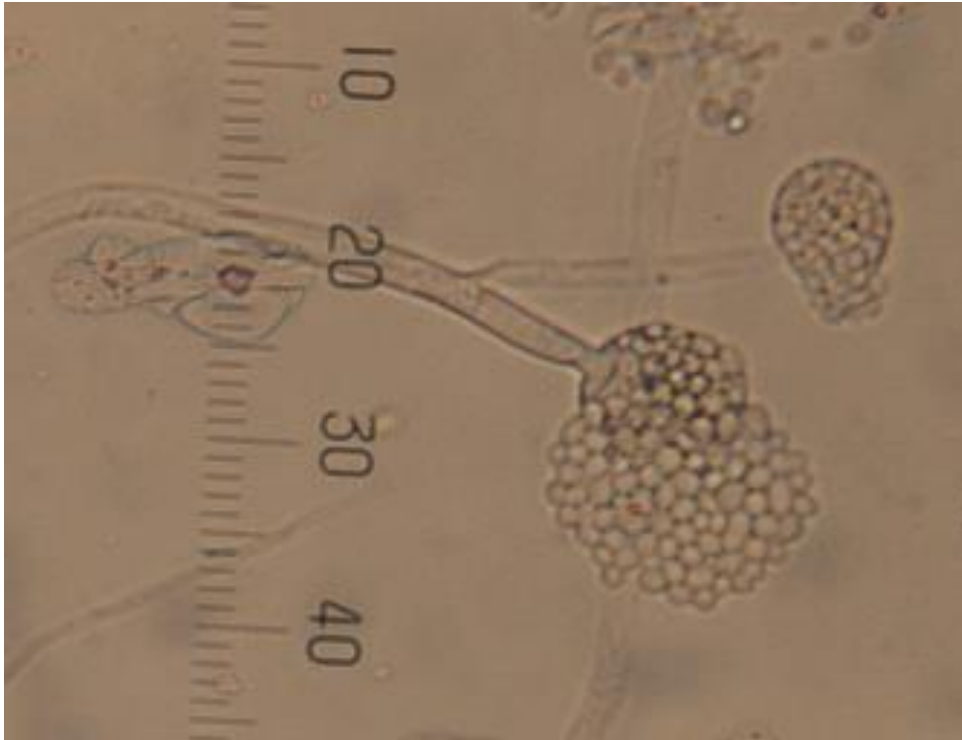
Arthrospores- spores formed from existing hyphae.

Mucor

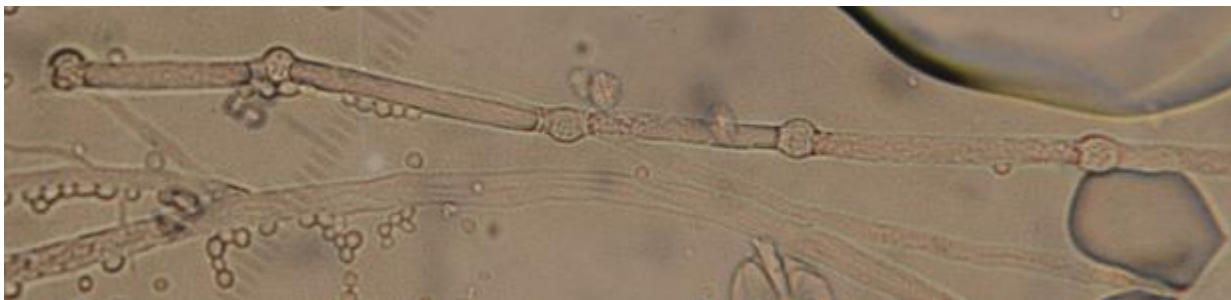


250x

Filamentous growth; branching, non-septate hyphae; globe-shaped sporangium; round spores.



400x
Sporangium with spores.



400x
Chlamydozooids (resting spores).

Penicillium



400x

Filamentous growth; branching, septate hyphae; phialides in finger-like arrangement.

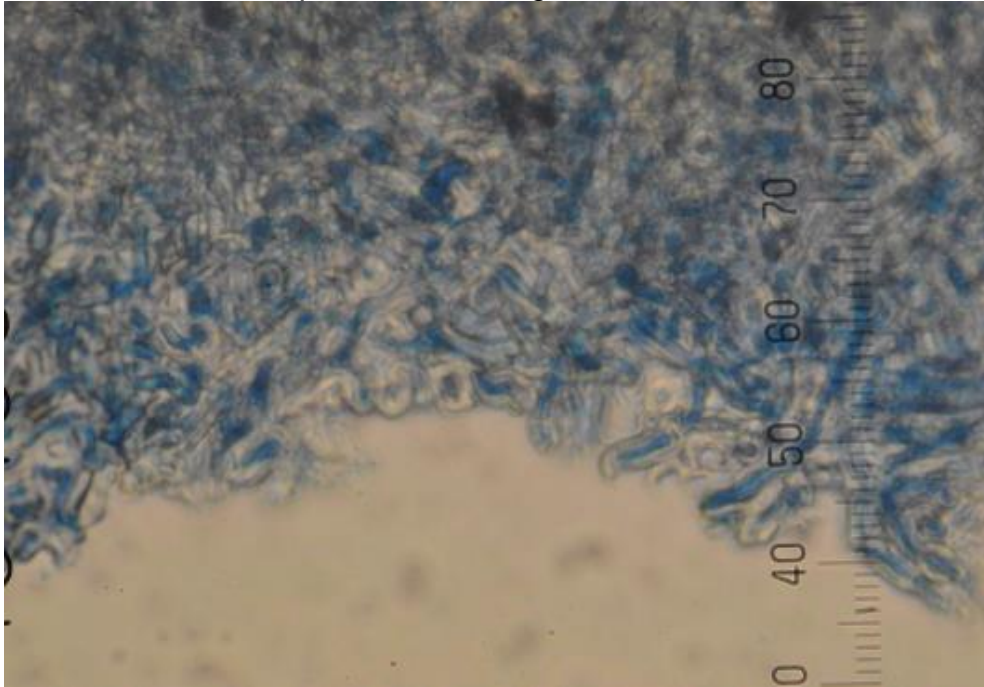
Rhizopus



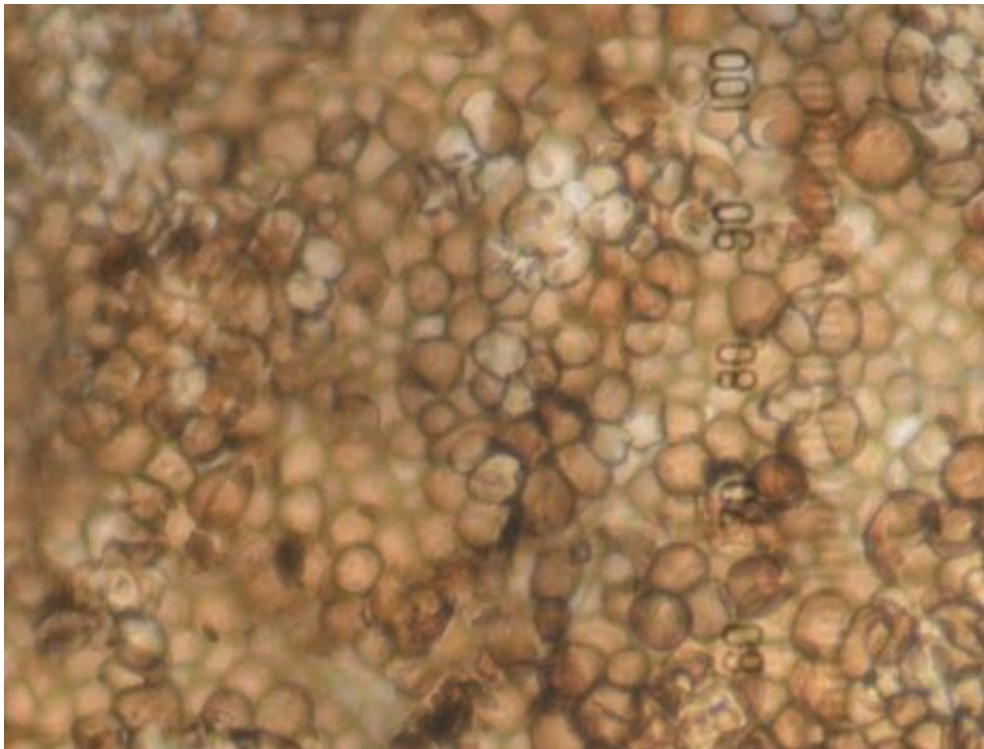
400x, Lactophenol cotton blue stain.

Sporangiospores- spores formed inside a sporangium; rhizoids.

Fungal sclerotium (Compact aggregate of fungal hyphae enclosed in a dark brown outer shell, capable of surviving adverse conditions in a dormant state.)



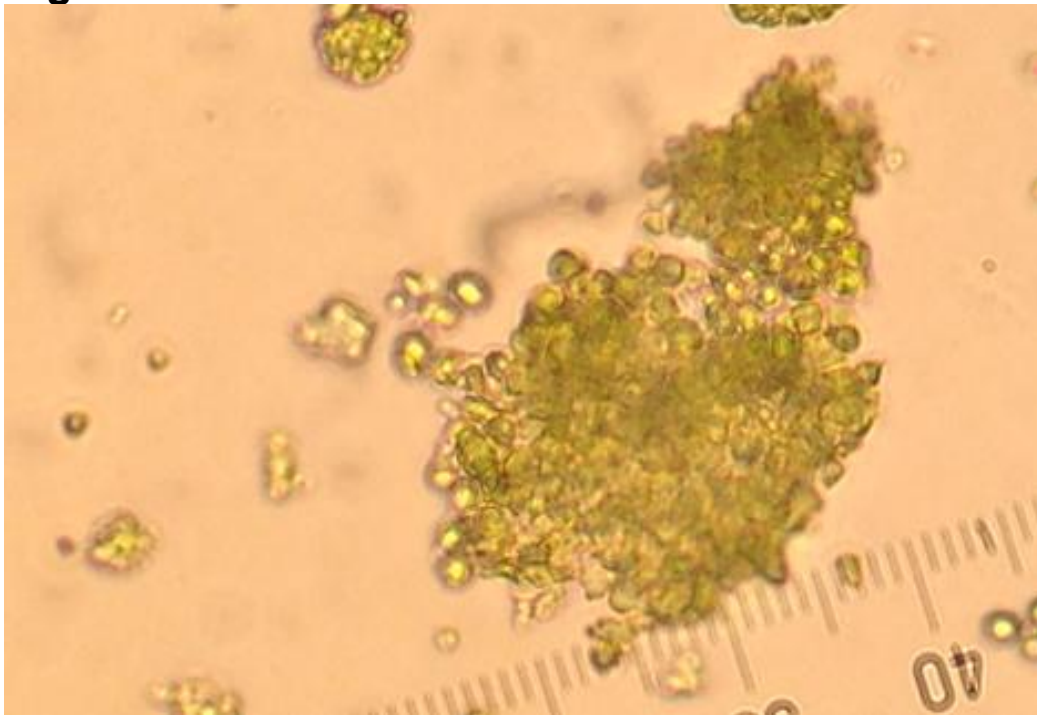
400x, Lactophenol cotton blue stain.
Compact mass of hyphae.



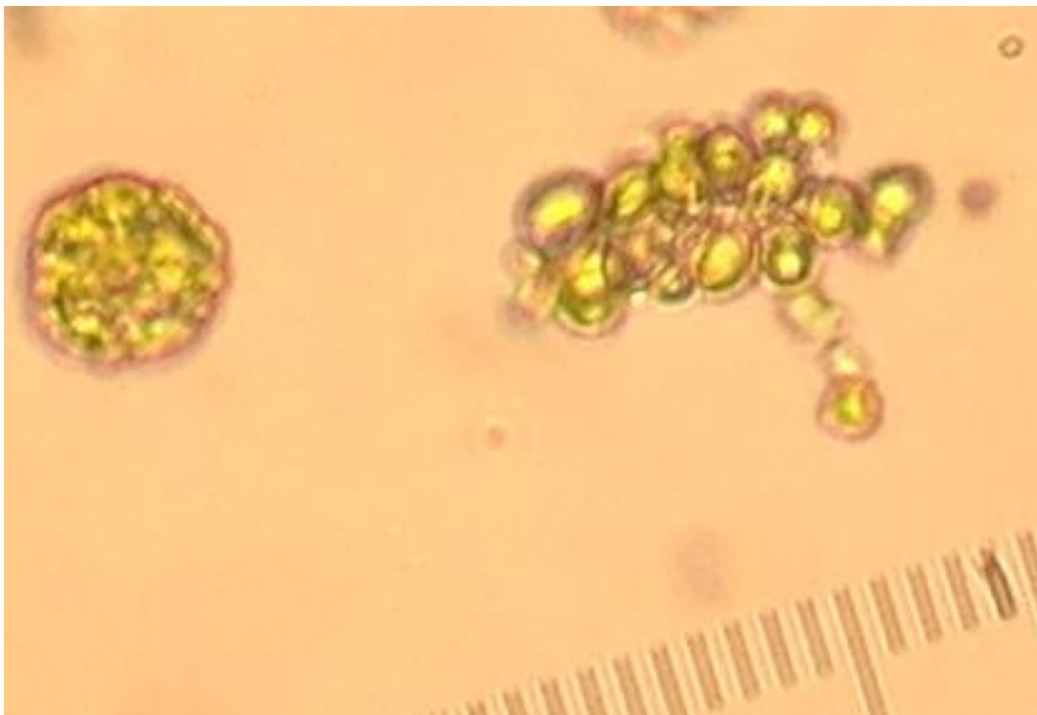
400x
Outer layer of melanised hyphal tips.

Miscellaneous

Algae - Chlorella

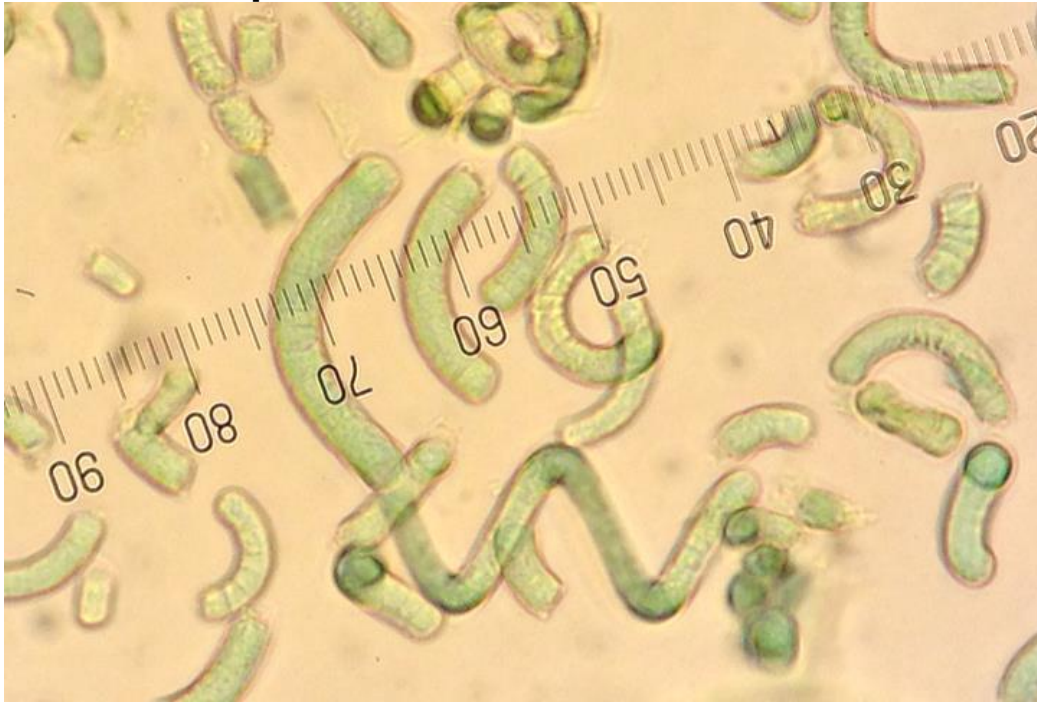


250x
Single-celled.



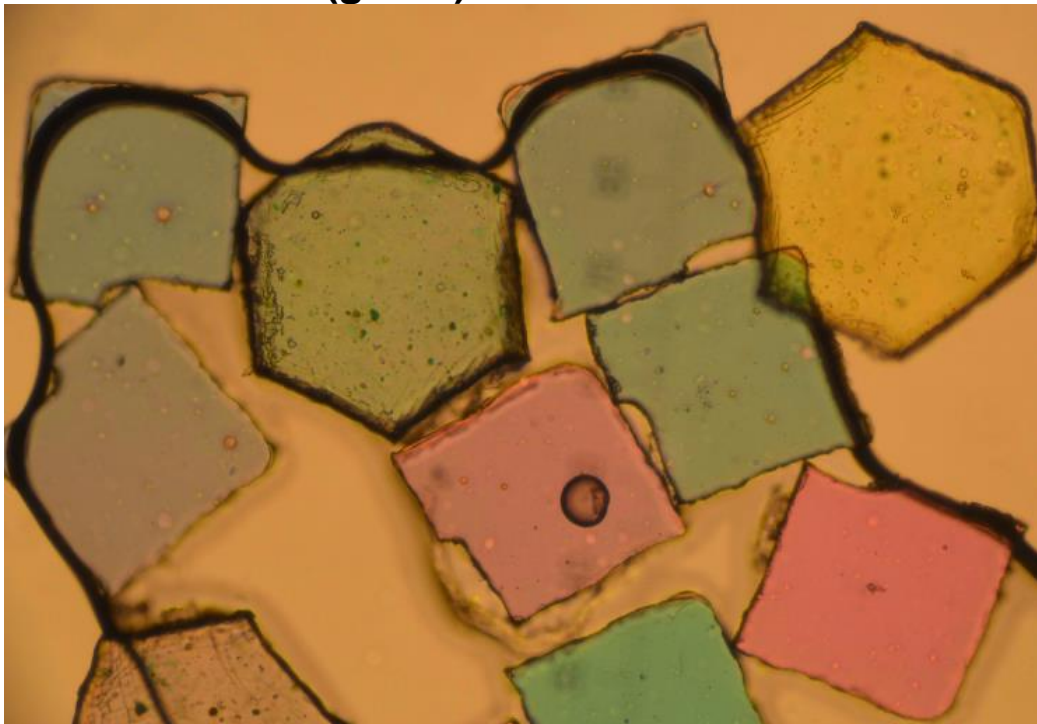
400x

- Spirulina



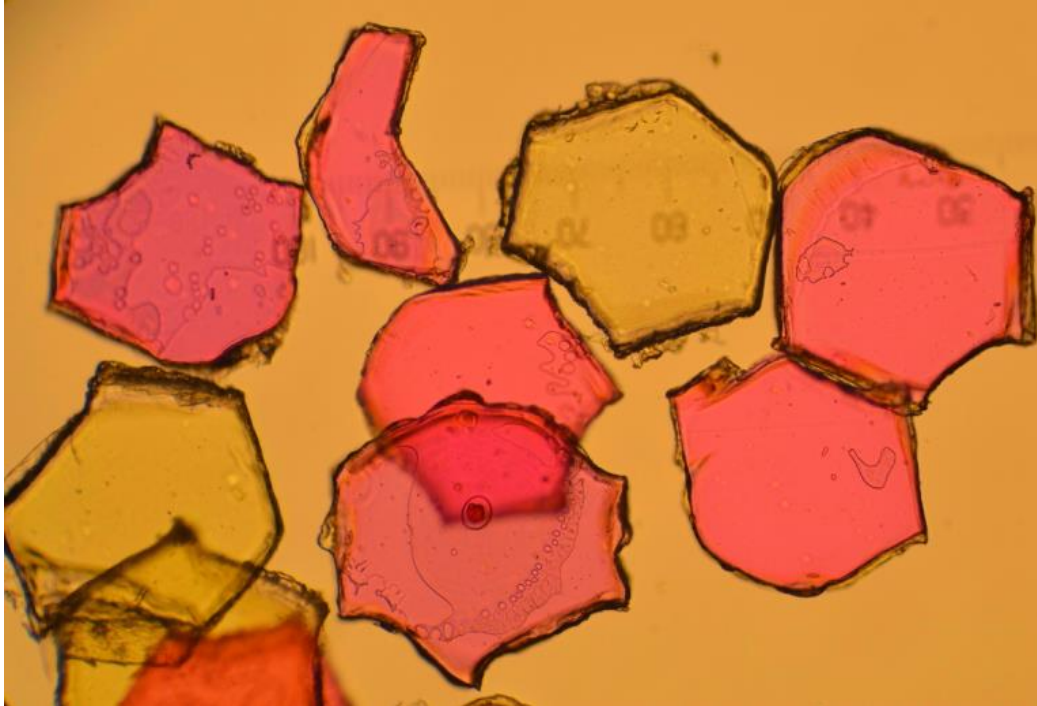
400x
Cylindrical helix, multi-cellular.

“Edible” Glitter (green)



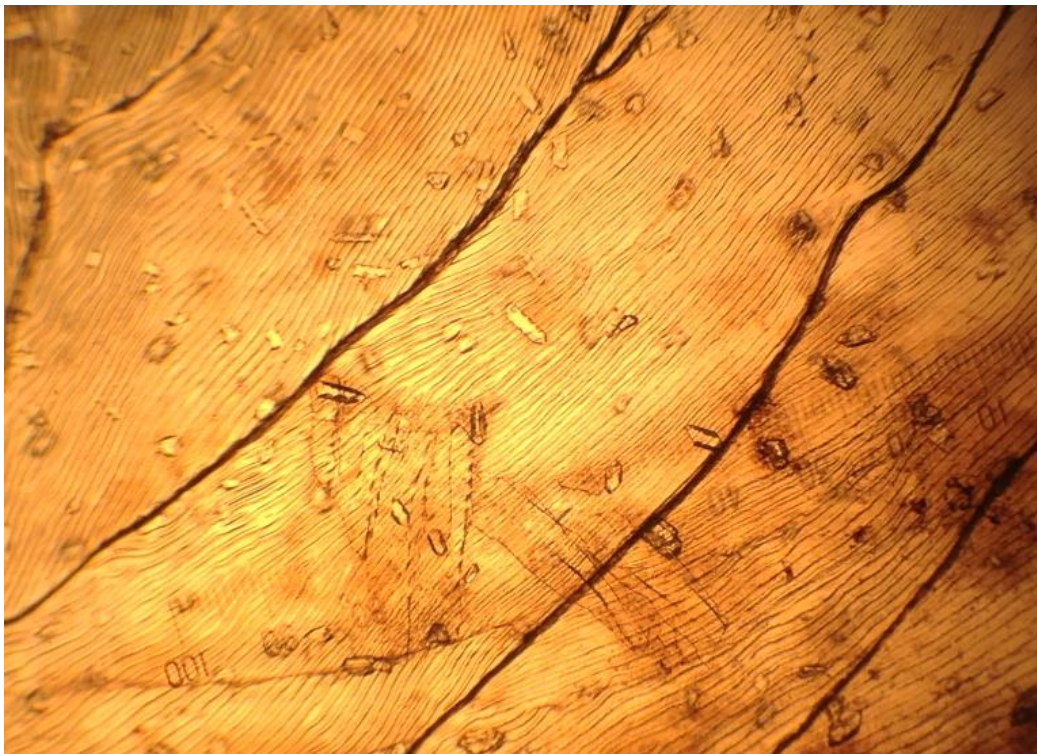
400x

“Edible” Glitter (pink)



400x

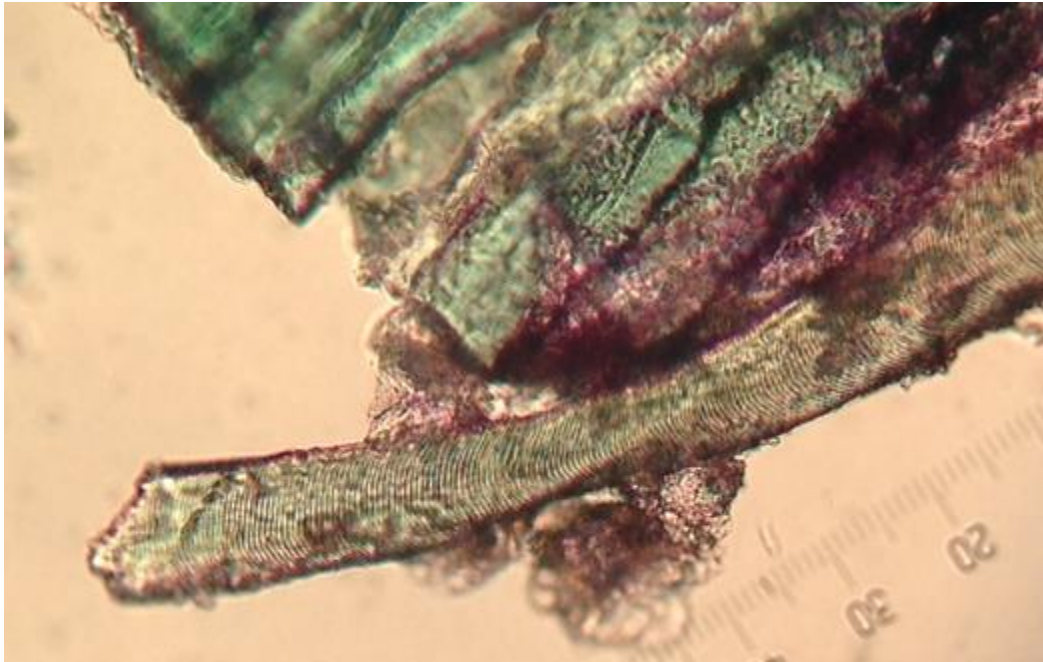
Fish scale



400x

Calcium oxalate crystals

Meat - muscle fibres

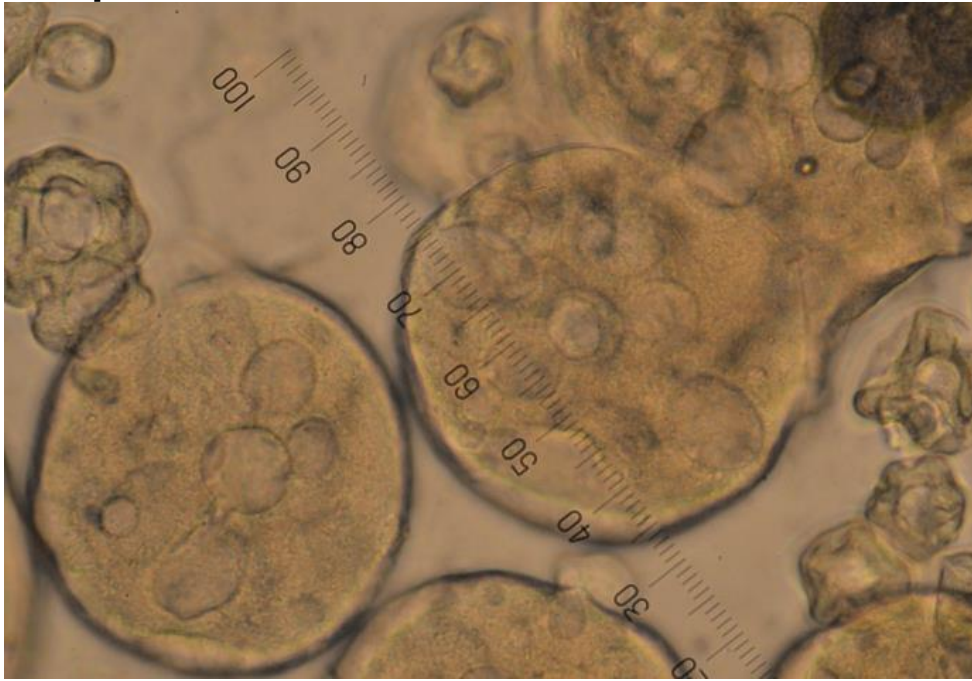


400x, Toluidine Blue stain.
Muscle fibre striations

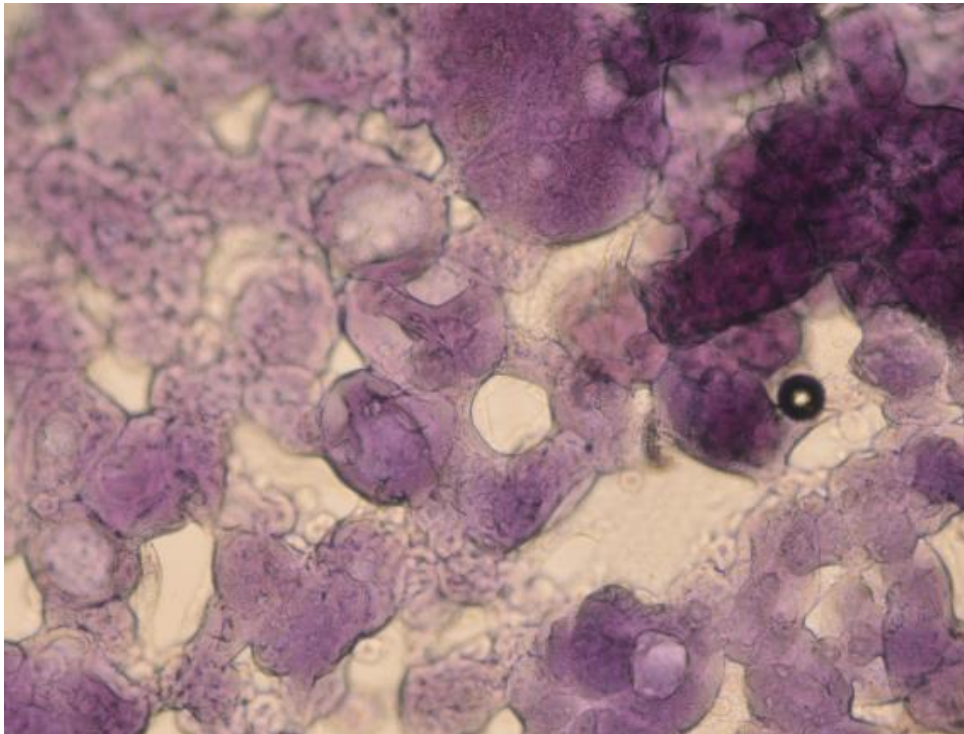


400x, Toluidine Blue stain.
Collagen, elastin, fibroblasts.

Pea protein isolate

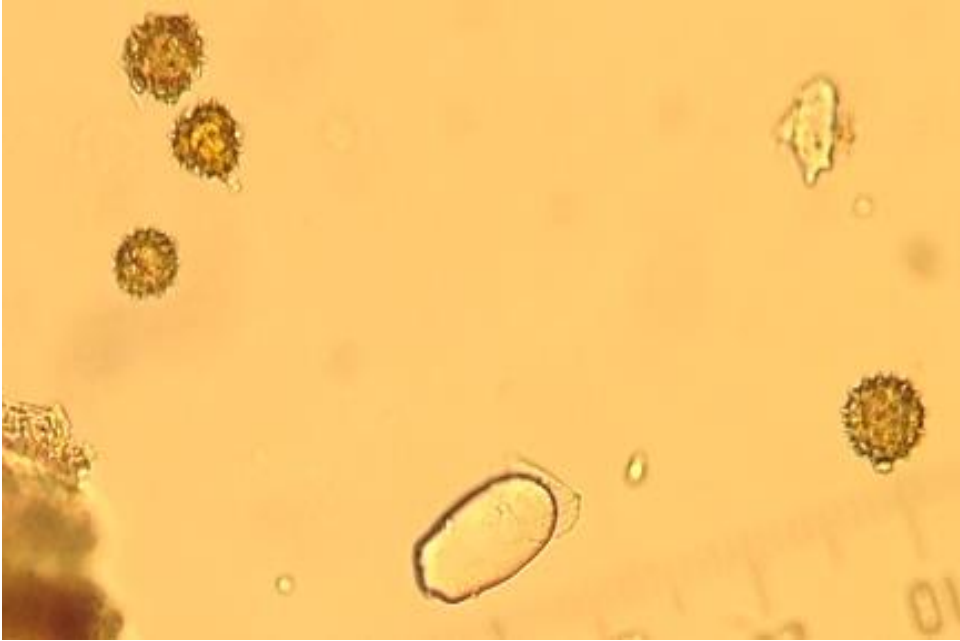


400x



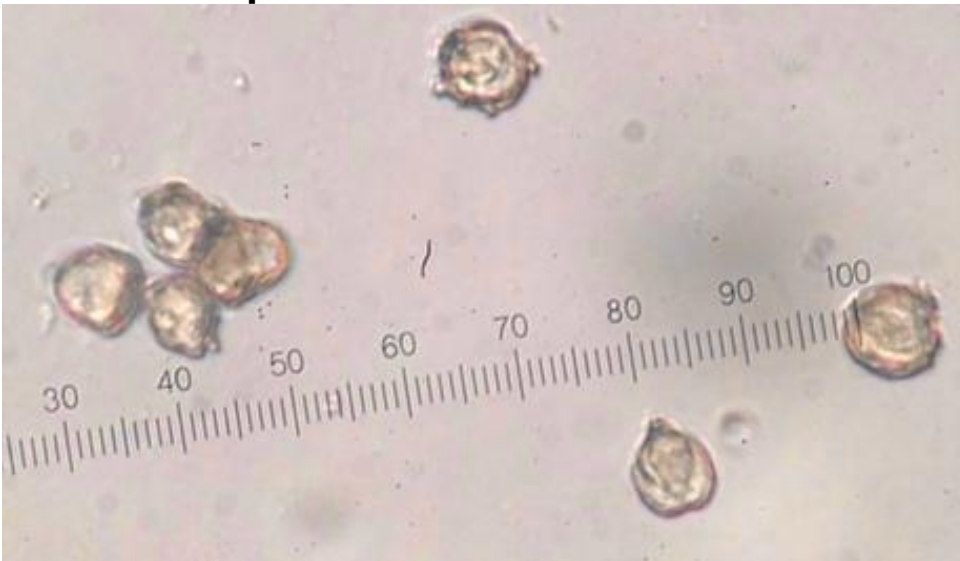
400x, ninhydrin stained.

Chamomile pollen



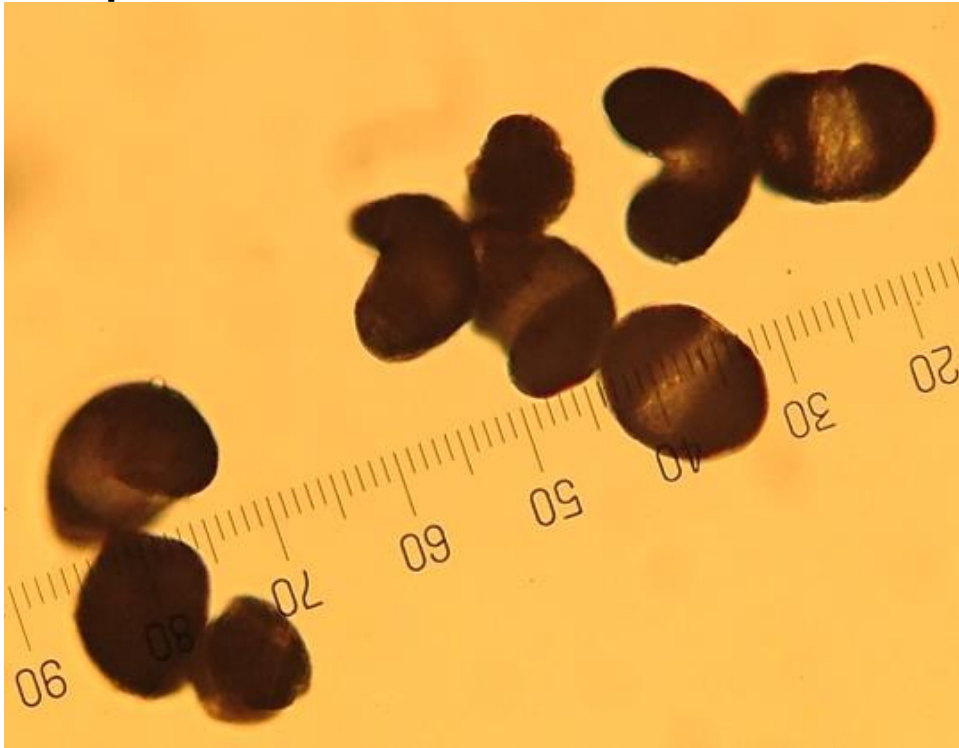
400x
Spherical; spiny, warty exine.

Elderflower pollen



400x

Pine pollen



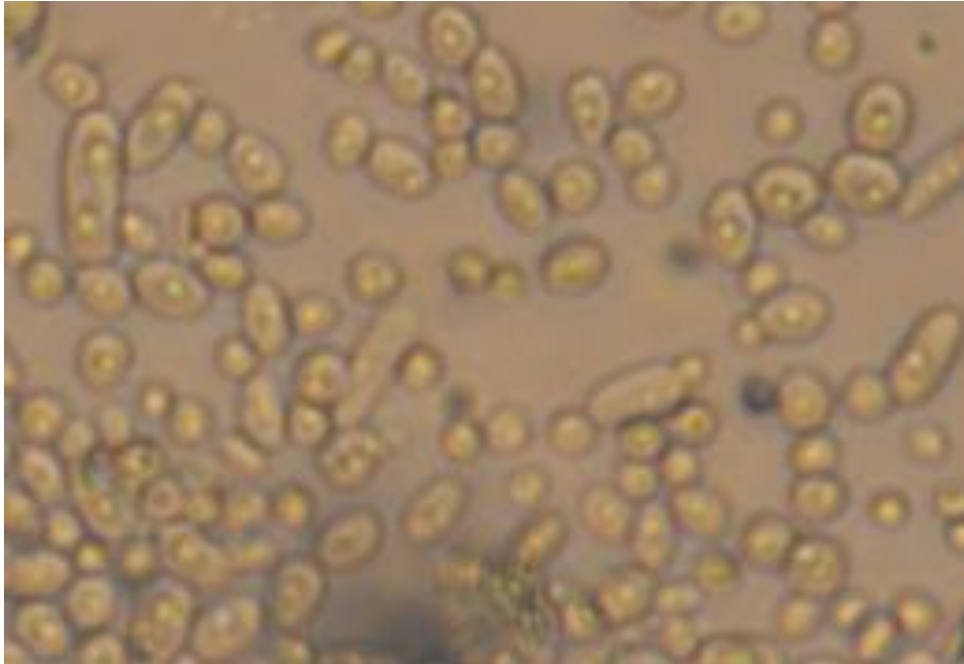
400x
One large chamber flanked by two smaller chambers.

Yeast



400x

Rod shaped yeast cells.



400x

Yeast cells showing binary fission.