USDA-APHIS-PPQ-S&T

ITP

USDA APHIS Identification Technology Program

Practical considerations for seed imaging

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https://idtools.org/

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Animal and Plant Health Inspection Service

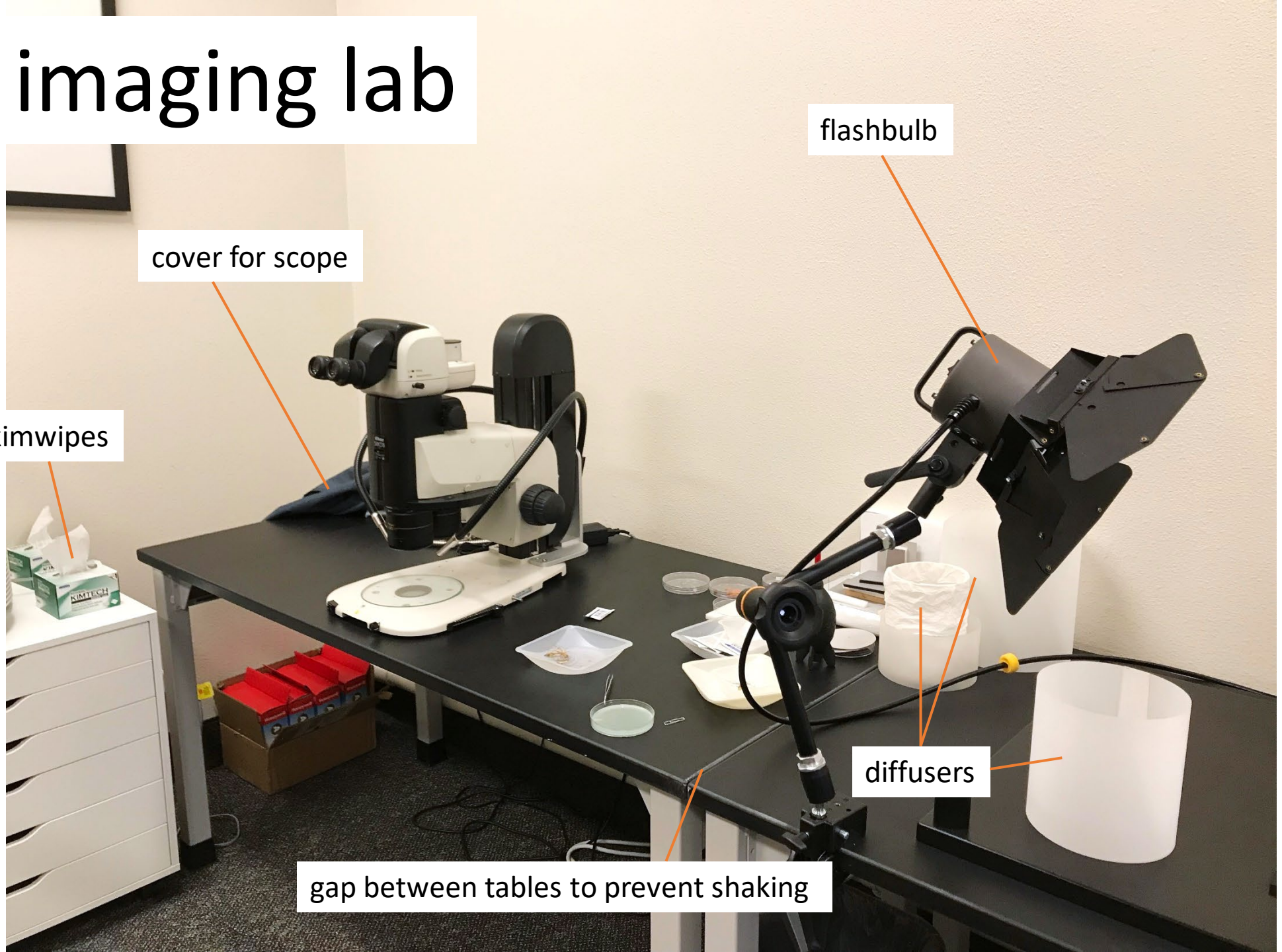
Key considerations for image quality

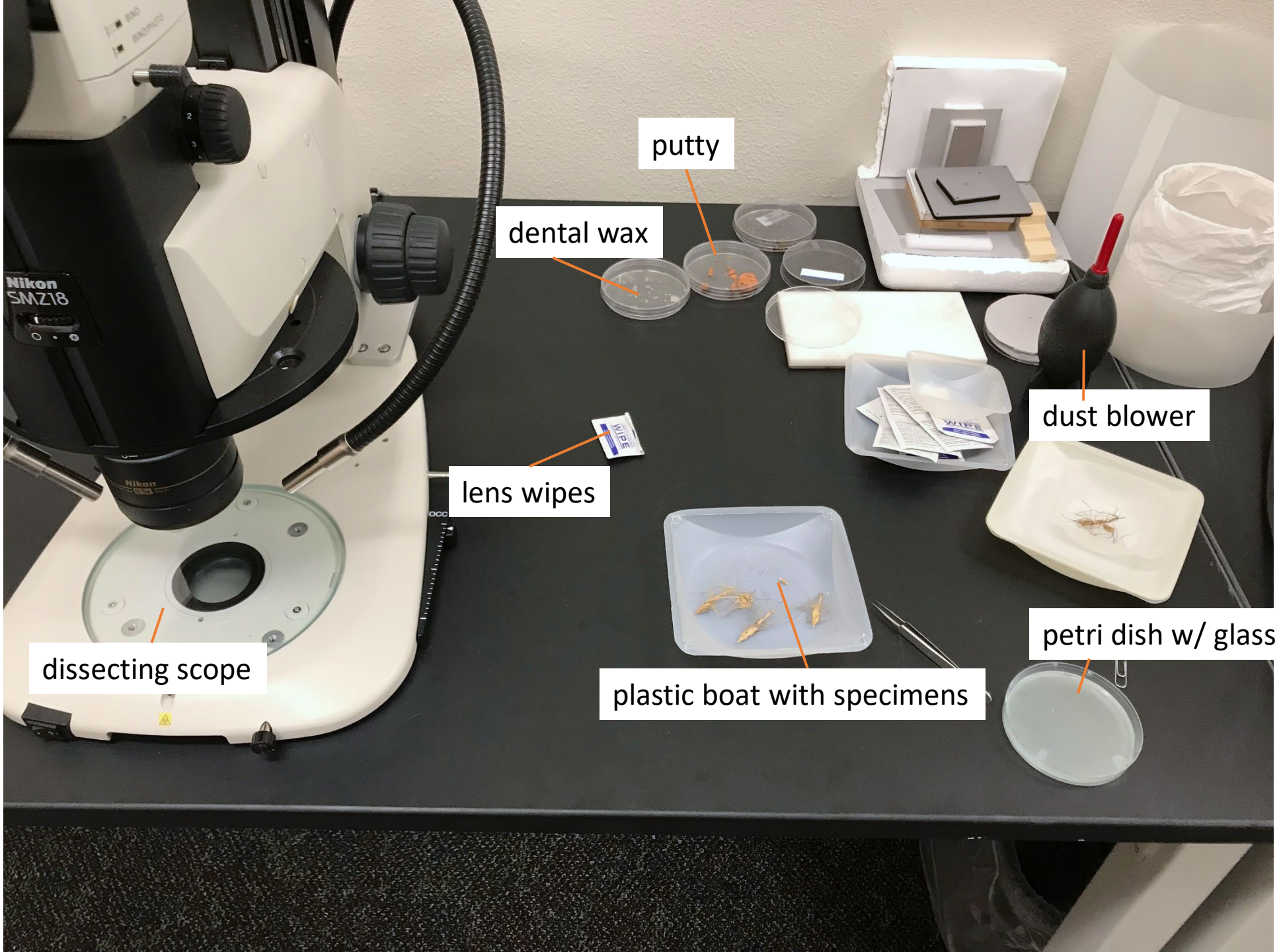
1. Minimize dust/contamination
2. Minimize movement
3. Lighting should be diffuse but bright
4. Camera settings should be appropriate for the circumstances
5. Stacking capabilities helpful for optimal quality, but not always needed

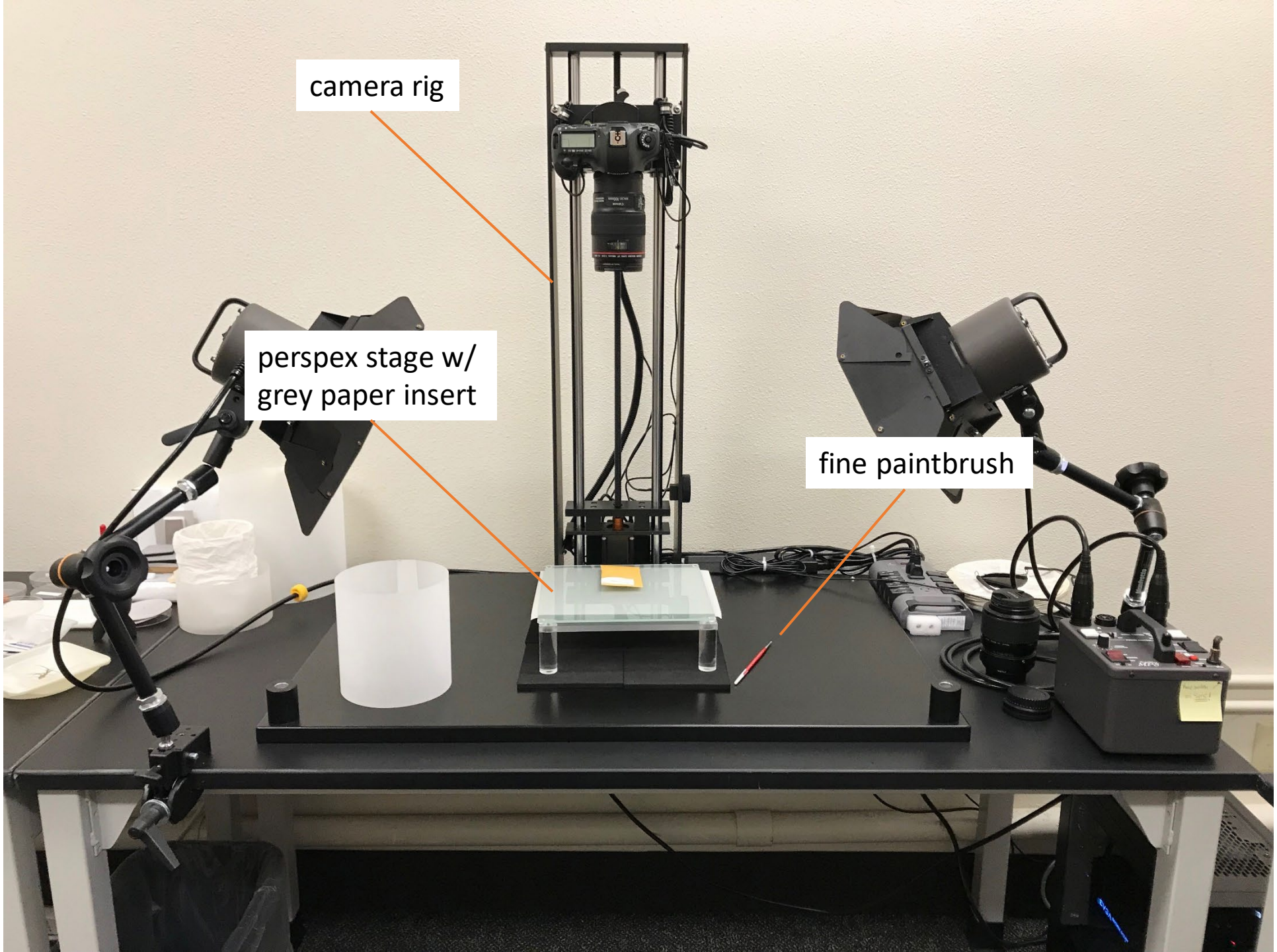
A detailed seed-imaging protocol and guide will be shared on the ISMA website.

Link to follow.

Our imaging lab




putty
dental wax
lens wipes
dissecting scope
dust blower
plastic boat with specimens
petri dish w/ glass inset


camera rig
perspex stage w/
grey paper insert
fine paintbrush

Moderately-priced alternatives

Tagarno digital microscope
(<$1000 US?)

Inexpensive alternatives

Phone-camera adapter for dissecting scope (~$20-300, depending on lens quality)

Gosky ($)

Labcam ($$$)

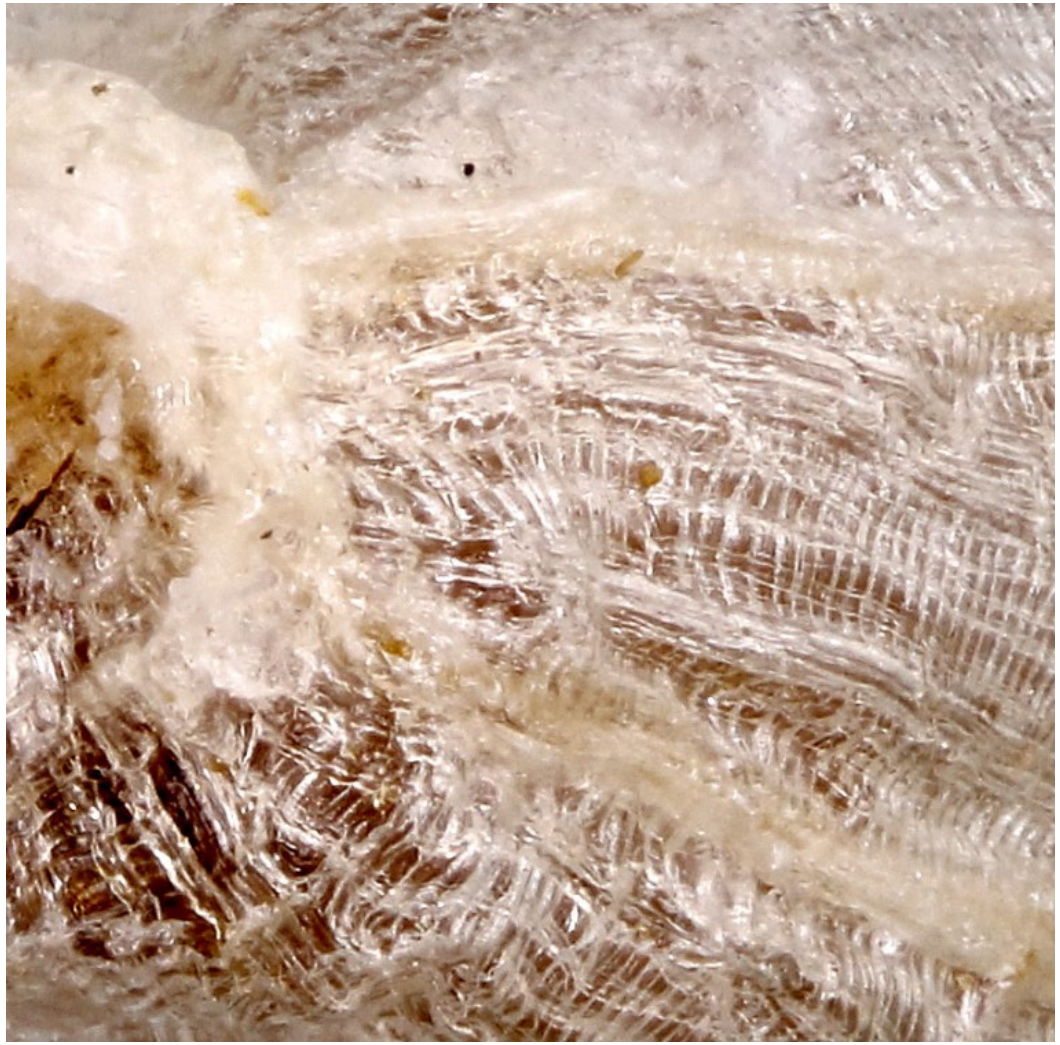
Inexpensive alternatives

Plugable USB microscope (~$35-50)

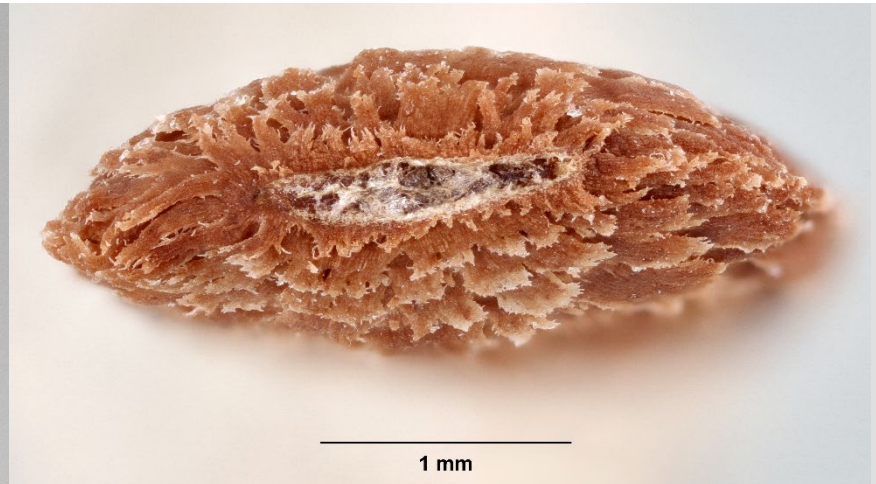
Imaging with 65mm lens

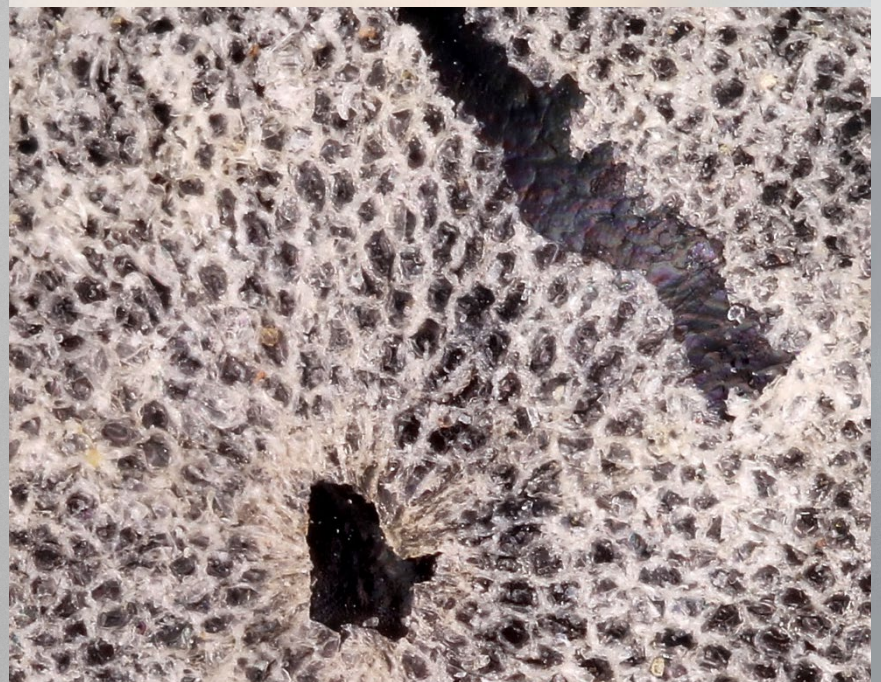
Imaging with 65mm lens

Microscope imaging



Microscope imaging





Background color effects

Defining terms

ISO brightness	ISO 100 = crisp image in good light ISO 400+ = noise in dark parts of image, but can compensate for dark settings
f-stop size of aperture	f-stop 4.0 = larger aperture, more light allowed in f-stop 8.0 = smaller aperture, less light allowed in
shutter speed	faster (e.g., 1/500, 1/250) = less exposure, less opportunity for blur slower (e.g., 1/15, 1/30) = more exposure, more opportunity for blur

Good image

No diffuser

Incorrect white balance

Poor lighting

Underexposure

Overexposure

Specimens moved during imaging

Correct settings

Final image

Lessons from our imaging lab

1. A clean environment and clean specimens mean less work later on.
2. Take care to set up the environment to minimize transfer of movement.
3. Time invested in setting up/testing the lighting and diffusion prior to imaging → time saved in post-processing.
4. All of this sounds simple, but it all takes practice to get right.

Acknowledgements

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*Quadrilateral Scientific Collaboration Working Group (the National Plant Protection Organizations (NPPOs) of Australia, Canada, New Zealand, and the United States).

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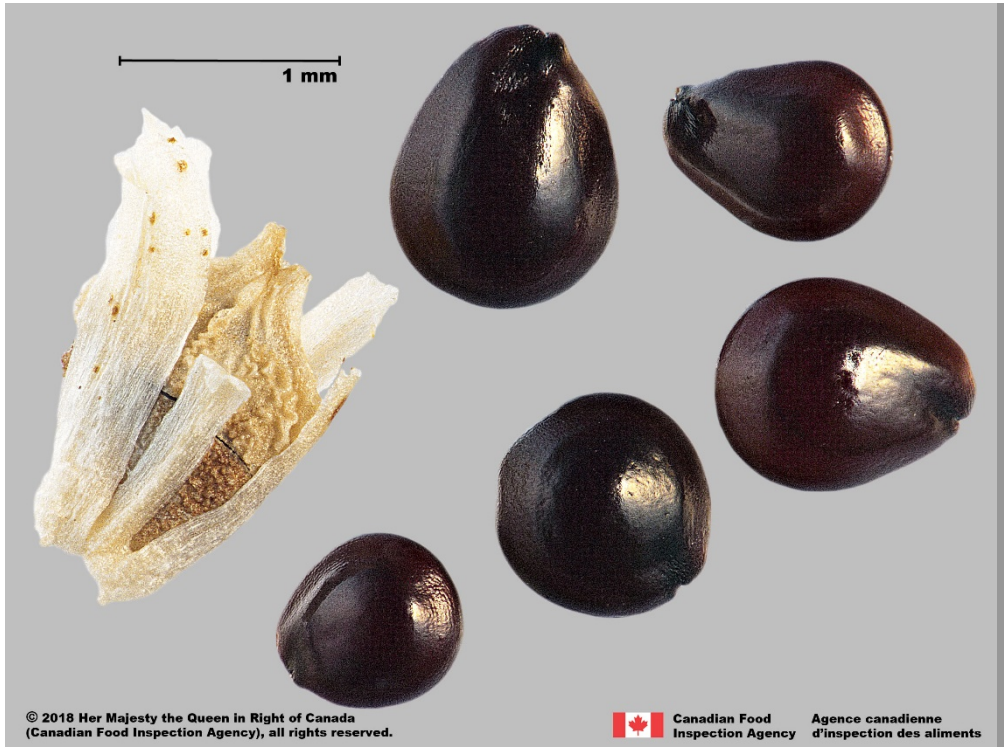
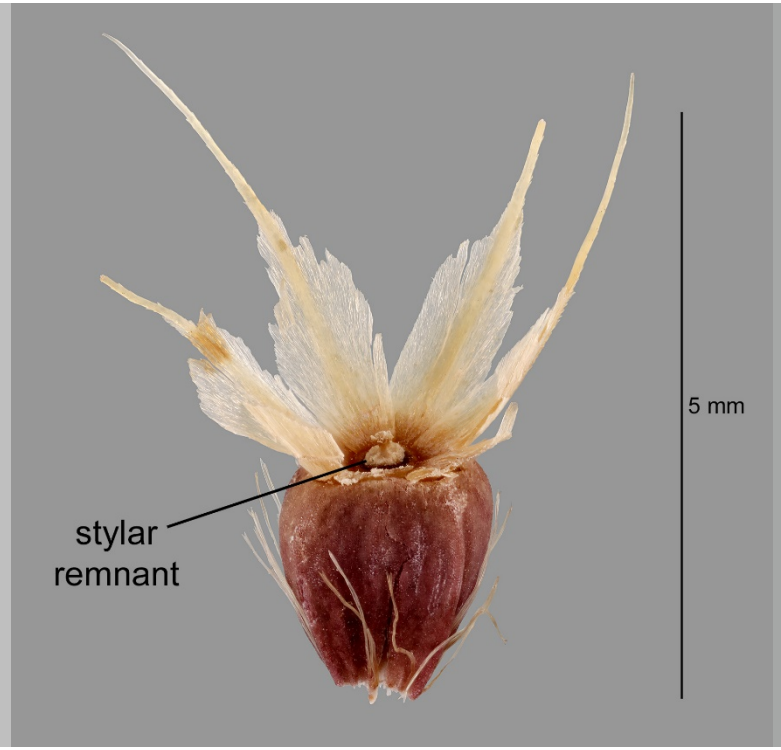
Thank you!





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