These images were prepared as part of the class MCR 485/683 Transmission Electron Microscopy at SUNY College of Environmental Science and Forestry, Spring 2019.

All images were acquired on the JEOL JEM 2100F Transmission Electron Microscope in the N. C. Brown Center for Ultrastructure Studies.
This portfolio includes a set of micrographs taken during the lab sessions in the MCR 683 class.

- Consists of two parts:

  **Part A:** Animal Tissue. Mouse liver embedded into the polymer matrix Epon 812

  **Part B:** Plant Tissue. Cellulose nanoparticles obtained by Christopher D. Wood, PhD
Part A: Mouse liver

Sample preparation

- Crosslinked with glutaraldehyde (cross-links amino groups (proteins) = stabilizes the structure of the sample) and Osmium tetroxide OsO₄ (cross links lipids + acts as a stain for TEM)
- Placed in solutions with gradually increased alcohol percentage solutions: 15, 30, 50, 70, 95 and three times with 100% EtOH
- Infiltrated with resin (ethanol was replaced with propylene oxide), embedded into Epon 812 (placed under vacuum, polymerized in the oven at 60°C overnight)
- Trimmed, faced and sectioned
- Stained with the uranyl acetate UA (2% in water) and lead citrate LC (1% in water)
Figure 1. TEM image of mouse liver. Thin sections were stained with UA and LC, image was taken with 200kV at 10kX. Bar = 1 µm.

This micrograph features
A - nucleus,
B - nucleolus,
C - nuclear pore complex,
D - rough endoplasmatic reticulum,
E - mitochondria.
This micrograph features:
A - mitochondria,
B - mitochondrial cristae,
C - rough endoplasmatic reticulum,
D - ribosomes,
Red arrow - double membrane of mitochondria.
Figure 3. TEM image of mouse liver. Thin sections were stained with UA and LC, image was taken with 200kV at 40kX. Bar = 200 nm.

This micrograph features
A - mitochondria,
B - mitochondrial cristae,
C - rough endoplasmatic reticulum,
D - ribosomes,
Red arrow - double membrane of mitochondria
Figure 4. TEM image of mouse liver. Thin sections were stained with UA and LC, image was taken with 200kV at 20kX. Bar = 500 nm.

This micrograph features
A - mitochondria,
B - mitochondrial cristae,
C - rough endoplasmatic reticulum,
D - ribosomes,
Red arrow - double membrane of mitochondria
Figure 5. TEM image of mouse liver. Thin sections were stained with UA and LC, image was taken with 200kV at 40kX. Bar = 200 nm.

This micrograph features:
A - rough endoplasmatic reticulum,
D - ribosomes
Figure 6. TEM image of mouse liver. Thin sections were stained with UA and LC, image was taken with 200kV at 6000X. Bar = 2 µm.

This micrograph features red blood cells in capillary
A - Red blood cells (RBCs), or erythrocytes,
B - capillary wall,
C - mitochondria,
D - rough endoplasmatic reticulum
Stained with the uranyl acetate UA (2% in water)*:

- Suspension solution droplet was put on the formvar-coated grid, left for 1 min (to allow the NP to settle down)
- Drop of UA was applied directly to the sample droplet, was left to set 15-30s to allow stain to deposit
- Excess droplet was removed by dipping the grid directly into the beaker containing DI water
- Grid was left to dry fully for 12-24 h in the vacuum chamber

Two types of samples: without shaking the bottle (leaving the precipitate aside) and after shaking (includes precipitated particles too)

S. Elazzouzi-Haferoui et al., Biomacromolecules (2008) 9, 57-65
Figure 7. TEM image of cellulose particles without shaking the bottle. Samples were stained with UA, image was taken with 200kV at 20kX. Bar = 500 nm.

Can be featured the microfibrillar structure of the cellulose sample.
Figure 8. TEM image of cellulose particles without shaking the bottle. Samples were stained with UA, image was taken with 200kV at 20kX. Bar = 500 nm.
Figure 9. TEM image of cellulose particles after shaking the bottle. Samples were stained with UA, image was taken with 200kV at 6000X. Bar = 2 µm.

Figure 10. TEM image of cellulose particles after shaking the bottle. Samples were stained with UA, image was taken with 200kV at 15kX. Bar = 500 nm.
Figure 11. TEM image of cellulose particles after shaking the bottle. Samples were stained with UA, image was taken with 200kV at 10kX. Bar = 1 µm.
Figure 12. TEM image of cellulose particles after shaking the bottle. Samples were stained with UA, image was taken with 200kV at 12kX. Bar = 1000 nm.
Figure 13. TEM image of cellulose particles after shaking the bottle. Samples were stained with UA, image was taken with 200kV at 30kX. Bar = 200 nm.
Figure 14. TEM image of cellulose particles without shaking the bottle. Samples were stained with UA, image was taken with 200kV at 12kX. Bar = 1000 nm.

Can be featured the microfibrillar structure of the cellulose sample.

(Image was taken after the presentation in the class)
Figure 15. TEM image of cellulose particles without shaking the bottle. Samples were stained with UA, image was taken with 200kV at 60kX. Bar = 200 nm.

Can be featured the microfibrillar structure of the cellulose sample.

(Image was taken after the presentation in the class)
Figure 16. TEM image of cellulose particles without shaking the bottle. Samples were stained with UA, image was taken with 200kV at 100kX. Bar = 100 nm.

Can be featured the microfibrillar structure of the cellulose sample.

(Image was taken after the presentation in the class)

Can be concluded, that thickness of all particles are pretty much same - around 16 nm, but the length is different.
Thank you for the attention. Any questions?