SUPPLEMENTAL MOVIE LEGENDS

Movie S1 Analysis of mitochondrial distribution and dynamics. 10 minutes time-lapse sequence of *A. gossypii* hyphae expressing Cox4-GFP in the presence and absence of 200 µM of the actin poison Latrunculin B. Three z-axis planes spaced by 1µM with 100 msec fluorescence exposure and one phase contrast image were acquired every 30 seconds and merged into one plane using false colors (GFP: green, Phase contrast: red). In the untreated hypha, a steady extension of the hyphal tip can be observed accompanied by anterograde flow of the dense Cox4-GFP stained mitochondrial network. Round-shaped spaces devoid of mitochondrial signal are likely occupied by nuclei. In the lower panel, the effect of Latrunculin B on the actin cytoskeleton can be observed indirectly by absence of directed hyphal tip extension and slight swelling of the hyphal tip. No anterograde movement of mitochondria can be observed.

Movie S2 Analysis of peroxisome distribution and dynamics. 10 minutes time-lapse sequence of *A. gossypii* hyphae expressing GFP-PTS1 in the presence and absence of 200 µM of the actin poison Latrunculin B. Three z-axis planes spaced by 1µM with 100 msec fluorescence exposure and one phase contrast image were acquired every 30 seconds and merged into one plane using false colors (GFP: green, Phase contrast: red). In both panels a large number of small dot-like GFP-PTS1 labeled peroxisomes can be observed. The peroxisomes are highly mobile making it difficult to track individual organelles from one time-point to another. In the lower panel Latrunculin B causes swelling of the hyphal tip and lack of extension due to disruption of the actin dependent polarized growth. Effects on peroxisomal dynamics and distribution are not obvious.

Movie S3 Electron tomography 3D model of organelles in *A. gossypii* hypha. The space-filling model includes most membrane-limited organelles: nuclei (purple) with nucleoli (red), mitochondria (orange), presumptive endosomes (light blue), multivesicular bodies (light green), presumptive vacuoles (blue), presumptive autophagosomes precursors (light violet spheres), peroxisomes (dark blue spheres) and vesicles (red and green spheres). Scale bar: 1 μm.