

ON THE PROBLEM OF SELF-ORGANIZATION IN THE APICAL PART OF THE GROWING *NEUROSPORA CRASSA* HYPHAE

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New data are presented on the spatial arrangement of the intracellular structures in the apical end of the vegetative hyphae of the filamentous fungus *Neurospora crassa* and the involvement of these structures in the tip growth of the hyphae. With the aid of intracellular fluorescent probes, peculiarities of elongation, branching, septation and nucleus morphology were studied in isolated 400- μ m-long apical fragment of *N. crassa* hyphae growing for several hours without influx of the nutrient materials from the mycelium. We found that: (i) the diameter and growth rate of newly developing branches decreased as compared to intact mycelium, but the initial orientation of growth did not change; (ii) the branching rhythm was altered; abnormally long internode distances appeared, and the development of some side-branch buds ceased; (iii) the character of the septation remained unchanged, as well as the hyphal segment length. In hyphae growing for 4.5-5.0 h in the isolation from the whole mycelium, the distance between the tip and the first septum was comparable with the respective value in intact mycelium, whereas the mean distance between the growth tip and the first side branch and the dispersion of this parameter was considerably higher than in intact mycelium. In branches growing in isolation from the intact mycelium for 1.5-4.5 h, the length of the nucleus-free apical zones near the growth tip and the nucleus morphology were similar to the respective characteristics known for the *N. crassa* mycelium. On the basis of the comparison of the behaviour of mitochondria and microtubules and the data on the electrical heterogeneity of the hyphal apex, a hypothesis is proposed about a possible supervisory role of the longitudinal electric field in the structural and functional organization of the growing tips of the *N. crassa* hyphae. This experimental model can be used for the investigations of the molecular and genetic mechanisms regulating the interactions between intracellular structures involved in the tip growth of *Neurospora crassa*.

References

1. Potapova T.V., Golyshev S.A. Revisiting a special structural order of a growing tip of the *Neurospora crassa* hypha // Fungal Genom Biol v.6 is.1 (2016) p.p.135-138. doi:10.4172/2165-8056.1000135
2. Potapova T.V., Boitsova L.Yu., Golyshev S.A., Dunina-Barkovskaya A.Ya. Tip Growth of *Neurospora crassa* upon Resource Shortage: Disturbances of the Coordination of Elongation, Branching, and Septation // Cell and Tissue Biology, Vol.10, No.6, (2016) pp.486-499.