Fungal Genetics Reports

Volume 40 Article 16

Do protoperithecia smell perithecia?

R. L. Metzenberg
University of Wisconsin

Recommended Citation

Metzenberg, R. L. (1993) "Do protoperithecia smell perithecia?," *Fungal Genetics Reports*: Vol. 40, Article 16. https://doi.org/10.4148/1941-4765.1407

Do protoperithecia smell perithecia?

Abstract

Long ago, Howe and Prakash (1969, Can. J. Genet. Cytol. 11:689-705) reported a surprising finding. Working with *Neurospora tetrasperma*, they initiated crosses by plating conidia onto part of a lawn of protoperithecia of the opposite mating type.

Do protoperithecia smell perithecia?

R.L. Metzenberg - Department of Biomolecular Chemistry, University of Wisconsin, Madison, WI 53606

Long ago, Howe and Prakash (1969, Can. J. Genet. Cytol. 11:689-705) reported a surprising finding. Working with *Neurospora tetrasperma*, they initiated crosses by plating conidia onto part of a lawn of protoperithecia of the opposite mating type. When a later plating of conidia was made onto a different part of the lawn, the presence of the first cross prevented the formation of perithecia from the second plating. They reported a similar phenomenon in *N. crassa*. They believed that an inhibitory product was formed, that it could diffuse tens of centimeters, and that transmission occurred primarily through hyphae and secondarily through medium. This was amended (Calhoun and Howe 1972, Planta 108:289-302) by suggesting that depletion of nutrients by the first cross was mainly responsible.

The following observation supports the inhibitor hypothesis of Howe and Prakash, at least for *N. crassa*. I inoculated two plates of Westergaard-Mitchell synthetic crossing medium with flP-A and incubated them for 5 days at room temperature (about 23oC). I then cut a gap across each lawn by removing a 3 mm wide strip of agar and the overlying mycelium, taking care that no connection remained between the areas. On one plate, I streaked a heavy suspension of conidia of wild type ORS-a onto the lawn bordering one side of the gap. The other plate served as an uncrossed control. Both plates were left undisturbed. Five days later, both plates were challenged by spotting a suspension of conidia -- across the gap from the first spotting in the experimental plate, and at the corresponding position on the control plate. No perithecia developed on the experimental plate, whereas perithecia developed in abundance on the previously uncrossed control. Apparently some inhibitory substance can bridge even a gap of dry plastic between lawn segments. A gaseous agent seems much more plausible than an electric field or other mysterious force. Though a gap does not prevent transmission of the inhibitor, it does appear to slow it down. Thus even ignoring differences in species, media, and protocols, my observations are not at odds with those of Howe and Prakash. I would interpret the data in Table II of their paper as suggesting inhibition, albeit incomplete, by a gas along with transmission through hyphae and medium.

What might the gas be? Ethylene has long been known as a hormone in higher plants. Nitric oxide has even broken into the popular press as a multifunctional bioactive gas in humans and other mammals. Still more recently, carbon monoxide has been implicated as a messenger in brain. A large number of volatile liquids are known to be trail-marking signals or mating pheremones in insects. I don't know of comparable agents in fungi. I bring this to the attention of the community because I am not prepared to work on it myself, but think it might be an attractive opportunity to study gaseous messenger synthesis and olfaction in a simple, genetically-tractable organism.