

# Mysterious gene functionally decoded

June 23 2014

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The protein BEM46 is found in all creatures having a nucleus. Mammals have several copies of this gene whereas fungus have only one copy. Some years ago the *bem46* gene was named under the top ten of the "known-unknown genes". Scientists of Kiel University show for the first time the link between *bem46* and reproduction as well as growth processes in fungus. These findings have been published online on June, 13th in the scientific magazine *Eukaryotic Cell*.

BEM46 proteins are evolutionary conserved, but their functions remain elusive. It was reported previously that the BEM46 protein in the fungus *Neurospora crassa* is targeted to the ER, and is essential for ascospore germination. "In the present study, we established a *bem46* knock-out strain of *N. crassa*. This *bem46* mutant exhibited ascospore germination lower than wild type, but much higher than the previously characterized *bem46*-overexpressing and RNAi lines", says Professor Kempken, senior scientist of the current study. Reinvestigation of the RNAi transformants revealed two types of alternative spliced *bem46* mRNA, with expression of either type leading to loss of ascospore germination. The results indicate that the phenotype was not due to *bem46* mRNA downregulation or loss, but caused by the alternative spliced mRNAs and their encoded peptides.

Using the *N. crassa* ortholog of the eisosomal protein PILA from *Aspergillus nidulans*, the scientists further demonstrated co-localization of BEM46 with eisosomes. Employing the yeast two-hybrid system, they identified a single interaction partner: the anthranilate synthase component two (*trp-1*). This interaction was confirmed in vivo by a split-

YFP approach. The  $\Delta$ trp-1 mutant showed reduced ascospore germination and increased indole production; bioinformatic tools were used to identify a putative auxin biosynthetic pathway. The involved genes exhibited varying transcriptional regulation among the different bem46 transformant and mutant strains. The team also investigated the strains' indole production in different developmental stages. "Our findings suggest that indole biosynthesis gene regulation was influenced by bem46 overexpression", says Professor Kempken. "Furthermore, we uncovered evidence of co-localization of BEM46 with the neutral amino acid transporter MTR."

**More information:** Kollath-Leiß, K., Bönninger, C., Sardar, P. and Kempken, F. (2014): "BEM46 Shows Eisosomal Localization and Association with Tryptophan-Derived Auxin Pathway in *Neurospora crassa*." *Eukaryotic Cell*, [dx.doi.org/10.1128/EC.00061-14](https://doi.org/10.1128/EC.00061-14)

Provided by Kiel University

Citation: Mysterious gene functionally decoded (2014, June 23) retrieved 24 April 2024 from <https://phys.org/news/2014-06-mysterious-gene-functionally-decoded.html>

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