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# A genetically encodable fungal bioluminescence system

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## Abstract

In this talk, discussed will be the identification and cloning of fungal luciferase and two enzymes of the biosynthesis pathway of fungal luciferin. Fungal luciferase was found to represent a new protein family with no known homologues. We verified the function of fungal luciferin biosynthesis pathway by introducing the identified genes into the genome of *Pichia pastoris*, creating a strain that is autoluminescent in standard medium with light intensity visible to the naked eye. Also, we tested the potential of fungal luciferase as a reporter gene in heterologous systems by its expression in *E. coli*, *P. pastoris*, *Xenopus laevis* embryos, and human cells. In all tested conditions, fungal luciferase proved functional, positioning itself as a promising new reporter gene. The availability of a complete eukaryotic luciferin biosynthesis pathway together with a new family of luciferases represent a new molecular playground holding numerous opportunities for basic and applied research. This work was supported by the Russian Science Foundation grant 17-14- 01169.

**Keywords:** fungal luciferin, fungal luciferase, luciferin biosynthesis pathway, luciferin recycling

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