Studies of biodiversity of luminous bacteria, cultivation, the structural organization of luminous bacteria, mechanisms and regulation of the luminescence, impulse character of bacterial luminescence, properties of the luminescent reaction were carried out \cite{Novosibirsk. Science, 1984; Sandalova T, Lindqvist Y., 1995; Medvedeva S.E. et al., Novosibirsk, Science, 1984; Vydryakova et al., 1995}

Luciferase-producing strains; strains with long-seiving mechanism of bioluminescence of higher fungi and the pathway of biosynthesis for fungal luciferin from the precursor were established \cite{Purtov et al.,2015}

The fungal luminescent system was first isolated and investigated from the mycelium of the luminous fungus Neonothopanus nambi \cite{Luminescence, 2012, DAN, 2013, 2014, 2015}

Mushrooms are not inferior to cells of natural luminous bacteria in sensitivity to various substances and can be used as biotests at appropriate adaptation to the conditions of measurement \cite{Vydryakova et al., 2011}.

Scientists of the IBP SB RAS with colleagues from Moscow and Japan, discovered the mechanism of bioluminescence of higher fungi and the pathway of biosynthesis for fungal luciferin from the precursor were established \cite{Purtov et al.,2015}.

**Bioluminescent bioassays**

- Microbiosensor is used to determine the toxicity of natural and waste water \cite{Puzyr., Medvedeva, 2016}.
- CRAB is used in clinical laboratories, technical microbiology, environmental monitoring.
- Bioluminoimeter, the technology for the preparation of bioassays Microbiosensor from luminous bacteria and KRAB reagent kits for bioluminescent microanalysis based on luminescent reaction enzymes (luciferase and NADN-FMN oxidoreductase) have been developed.

**Effect of external factors on mycelial pellets luminescence**

- Incubation in water.
- Adding 5 μl hydrogen peroxide and mixing of the sample.
- Adding 5 μl hot extract of the fruiting bodies Pholota squarrosa and mixing of the sample.

**Mechanism of fungal bioluminescence**

Petri dish with 36-day mycelium and its “flashing” areas with varying level of luminescence. Registration of the GelDoc XR Imaging System image with an interval of 10 minutes.

**Dynamics of the luminescent signal of sawdust taken from a dead tree**

- Adding 5 μl hydrogen peroxide and mixing of the sample.
- Adding 5 μl hot extract of the fruiting bodies Pholota squarrosa and mixing of the sample.

**Method for identifying loci of armillariasis by use glowing sample of wood has been developed**; it can be used regardless of the season of the year \cite{Puzyr., Medvedeva, 2016}.

**Dynamics of the luminescent signal of sawdust**

\[ 1 \text{– incubation in water; } 2 \text{– mixing of the sample; } 3 \text{– adding 5 μl hydrogen peroxide and mixing of the sample; } 4 \text{– adding 5 μl hot extract of the fruiting bodies Pholota squarrosa and mixing of the sample.} \]


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