

A detailed 3D rendering of a fungal structure, likely a mold. It features numerous thick, cylindrical hyphae in shades of light blue and cyan. These hyphae are densely packed and branch out, with many of them terminating in large, spherical spores. The spores are also rendered in similar blue and cyan tones, with some showing a slightly textured surface. The background is a dark, almost black space, punctuated by small, bright white and yellowish particles, giving the impression of a microscopic or laboratory environment. The overall lighting is soft, highlighting the three-dimensional nature of the structures.

**DEPARTMENT OF
MYCOLOGY**



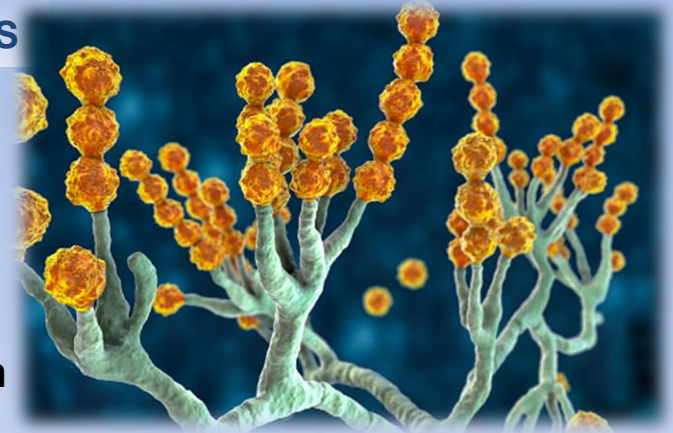
BIODIVERSITY AND MOLECULAR BIOLOGY OF MICROMYCETES

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METABOLISM AND ITS REGULATION IN MICROMYCETES

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Main Research Topics

- ❑ Taxonomic identification of fungal species;
- ❑ Fungal morphology, physiology and biochemistry under normophysiological and stress conditions;
- ❑ Fungal cell response against different type of stresses such as oxidative stress, heat- and cold shock, stress of immobilization and heavy metal exposure; evaluation of oxidative stress biomarkers; antioxidant enzyme defense;
- ❑ Fungal cell factories for production of valuable biological-active compounds by free and immobilized cultures; cold-active enzymes; regulatory mechanisms in the biosynthesis; purification and characterization of enzymes;
- ❑ Fungal biodegradation of natural and synthetic polymers (wood, leather, textile, historical records, etc.); laboratory expertise, consultations, instructions for preservation and elimination of fungi; mechanism of action of fungicide substances; methods for application of fungicides.
- ❑ Antifungal activity of various natural and synthetic substances

CURRENT RESEARCH

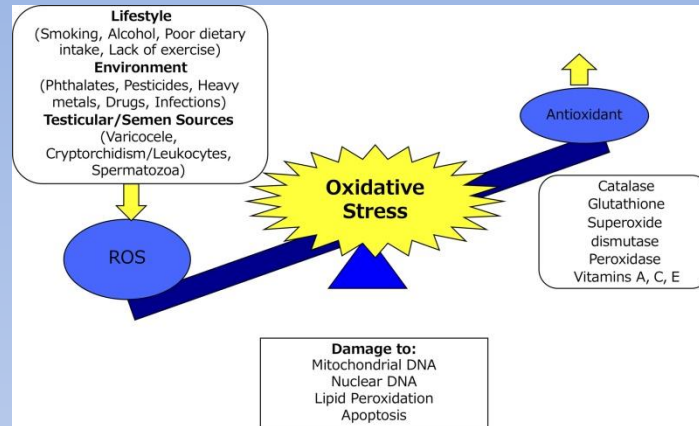
Fungal diversity

A sizeable fungal collection was developed along with the isolation of strains from temperate and extreme environments. The collection contains strains from Alaska, different regions of Antarctica, Bulgarian caves and tombs, as well as fungal inhabitants in Egypt's tombs and mosques, saline environments.

The investigations provide new information on the myco biodiversity in these habitats as well as their biotechnological potential.



CURRENT RESEARCH



Oxidative stress (OS)

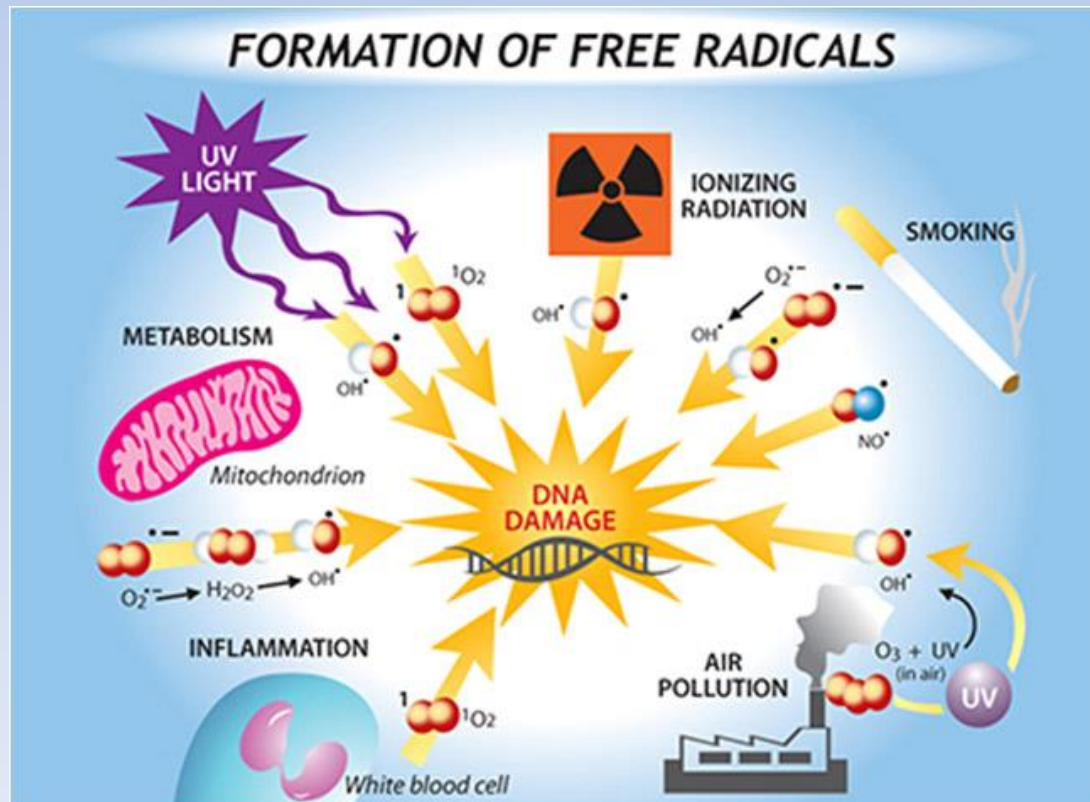
We focus our attention on better understanding OS response in lower multicellular eukaryotes. Filamentous fungi from different species are being used as model microorganisms. Treatment of the fungal strains with various stimuli generating reactive oxygen species (ROS) induces a state of oxidative stress. Related research targets evaluation of:

- (1) stress biomarkers (cyanide-resistant respiration; direct assessment of ROS production; oxidative damaged proteins; synthesis of reserve carbohydrates etc);
- (2) antioxidant enzyme defense (superoxide dismutase, SOD and catalase, CAT);
- (3) subcellular localization of enzymes;
- (4) changes in activities of key enzymes from basic metabolite pathways. In addition, we are studying the relationship between oxidative stress and cell aging.

CURRENT RESEARCH

Relationship between OS and other types of stresses

- Metal-induced stress.
- Heat-shock.
- Metabolite adaptation to cold temperatures.
- Stress of immobilization.

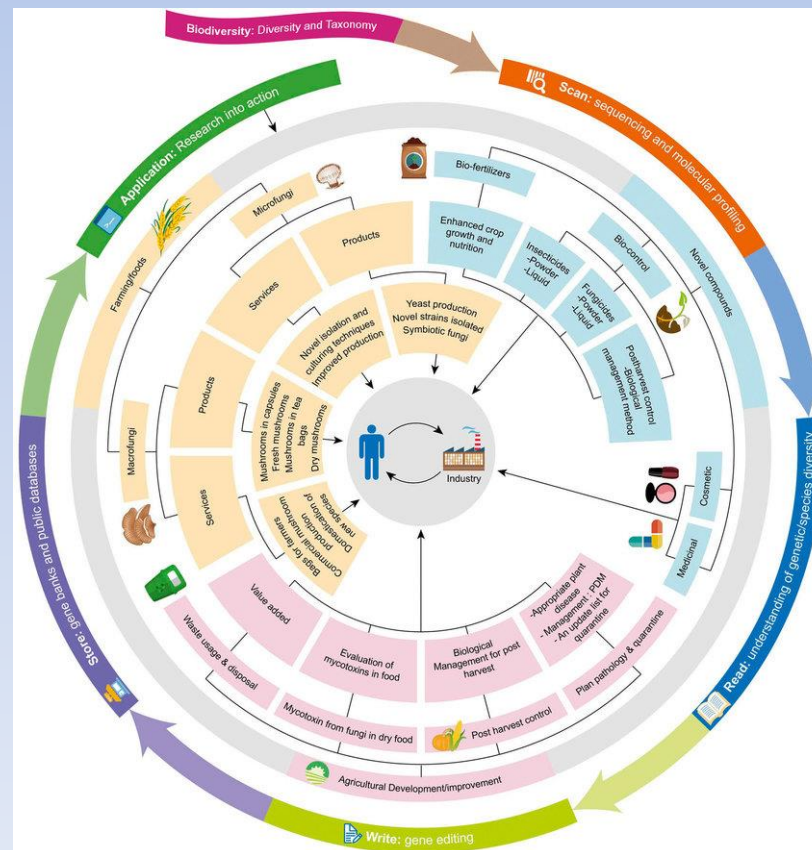


CURRENT RESEARCH

Fungi as cell factories for production of valuable biological-active compounds

Original fungal strains producers of biological-active compounds are isolated and characterized. The group has a high qualification in the development of laboratory methods for the production of extra- and intra-cellular enzymes.

A new direction in our work are physiological and biochemical investigations of the biosynthesis and regulation of activity of valuable cold-active enzymes in psychrophilic and psychrotrophic fungi, using existing collections of Antarctic strains.

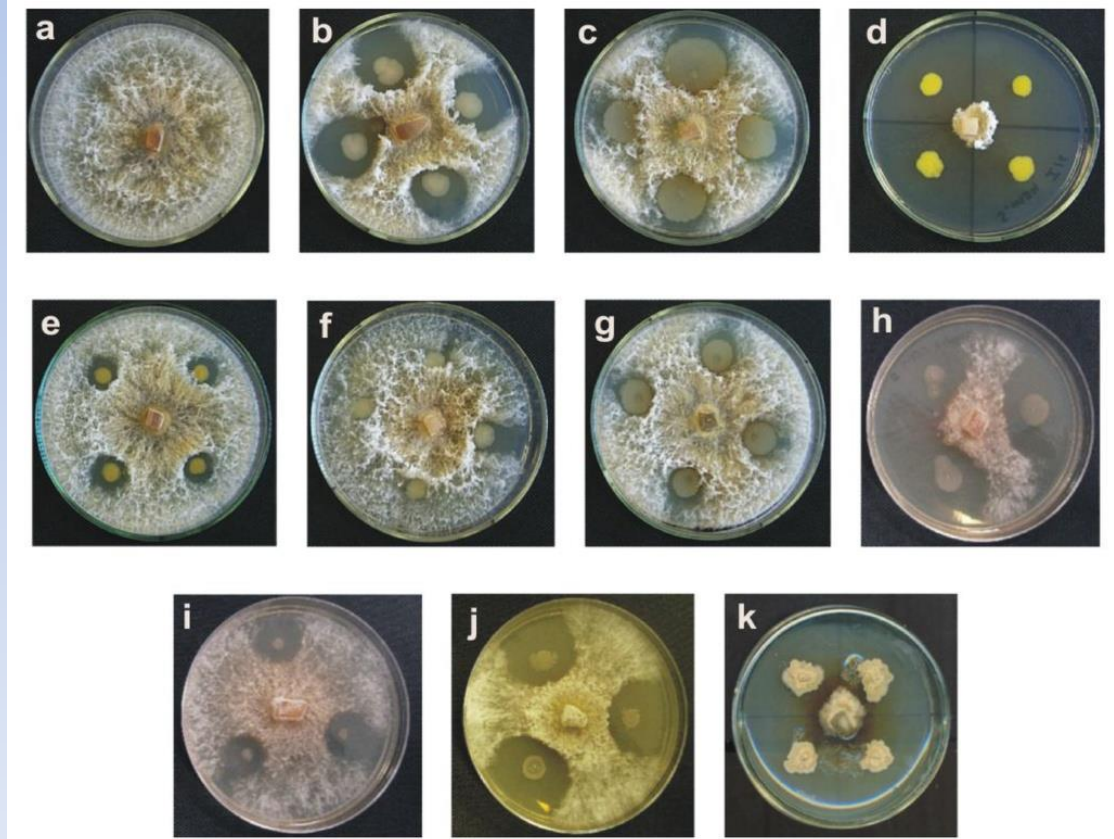


CURRENT RESEARCH

Fungal biodegradation of natural and synthetic polymers

Due to the current knowledge about morphology and biochemistry of the filamentous fungi, as well as the professional experience some methods concerning the preservation of natural polymers from fungal biodegradation were developed.

Antifungal activity of natural and synthetic products



Recent projects

- KP-06-N21/13/2018 Novel enzymes of sialidase family in filamentous fungi
Project leader: Assoc.prof. Radoslav Abrashev
- № KP-06-N36-2: -Leguminous plants in Bulgaria - a source of useful additional substances of a protein nature
Team leader: Assoc. Prof. Ekaterina Krumova
- DO1-217/30.11.2018 BioActivMed Innovative low-toxic biologically active agents for precision medicine
Team leader: Prof. Hristo Najdenski
- № KP-06-PM47/14 Geopolymer coatings with antimicrobial properties
Project leader: Assoc.prof. Alexander Nikolov

SELECTED PUBLICATIONS

- **Stoyancheva G., Dishliyska V., Miteva-Staleva J., Kostadinova N., Abrashev R., Angelova M., Krumova E.** Sequencing and gene expression analysis of catalase genes in Antarctic fungal strain *Penicillium griseofulvum* P29. *Polar Biology*, Springer, 2022, DOI:<https://doi.org/10.1007/s00300-021-03001-4>, SJR (Scopus):0.874, JCR-IF (Web of Science):2.31 **Q1**
- **Eneva R., Engibarov S., Gocheva, Y., Mitova, S., Arsov, A., Petrov, K., Abrashev, R., Lazarkevich, I., Petrova, P.** Safe Sialidase Production by the Saprophyte *Oerskovia paurometabola*: Gene Sequence and Enzyme Purification. *Molecules*, 27, 24, MDPI, 2022, ISSN:1420-3049, DOI:<https://doi.org/10.3390/molecules27248922>, SJR (Scopus):0.71, JCR-IF (Web of Science):4.927 **Q1**
- **Krumova E., Koeva E., Stoitsova, S., Paunova-Krasteva, T., Stoyancheva G., Angelova M.** Cell response of Antarctic strain *Penicillium griseofulvum* against low temperature stress.. *Polish Polar Research*, 43, 2, 2022, DOI:10.24425/ppr.2021.138587, 125-143. SJR (Scopus):0.421, JCR-IF (Web of Science):1.308 **Q3 (Scopus)**
- **Jeny Miteva-Staleva, Ekaterina Krumova, Galina Stoyancheva, Nedelina Kostadinova, Petar Grozdanov, Boryana Spassova, Maria Angelova.** Isolation, Identification and Proteolytic Activity of Filamentous Fungi from Alaska. *Acta Microbiologica Bulgarica*, 38, 1, 2022, 26-30. SJR (Scopus):0.115 **Q4 (Scopus)**
- **Abrashev R., Krumova E., Kostadinova N., Miteva-Staleva J., Dishliyska V., Spassova B., Angelova M.** Isolation and characterization of cold-active antioxidant enzymes from Antarctic fungi. *Modern microbiology: a challenge for improving the quality of life*, publishing house Farrago, 2022, ISBN:978-619-206-207-1, 258-270

- **Abrashev, R, Krumova, E, Petrova, P, Eneva, R, Kostadinova, N, Miteva-Staleva, J, Engibarov, S, Stoyancheva, G, Gocheva, Y, Kolyovska, V, Dishliyska, V, Spasova, B, Angelova, M.** DISTRIBUTION OF A NOVEL ENZYME OF SIALIDASE FAMILY AMONG NATIVE FILAMENTOUS FUNGI. *Fungal Biology*, 125, 5, Elsevier, 2021, ISSN:1878-6146, DOI:<https://doi.org/10.1016/j.funbio.2020.12.006>, 412-425. SJR (Scopus):0.942, JCR-IF (Web of Science):3.13 **Q1**
- **Krumova, E., Andreyinski N., Abrashev, R., Stoyancheva, G., Kostadinova, N., Miteva Staleva, J., Dishliyska, V., Spasova, B., Angelova M.** Comparison of the Oxidative Stress Response of Two *Aspergillus fumigatus* Strains Isolated from Polluted Soils against Combined Heavy Metal Toxicity,. *Geomicrobiology Journal*,, 2021, DOI:DOI: 10.1080/01490451.2021.1897712, SJR (Scopus):0.57, JCR-IF (Web of Science):2.308 **Q2**
- **Krumova E., Abrashev R., Dishliyska V., Stoyancheva G., Kostadinova N., Miteva-Staleva J., Spasova B., Angelova M.** Cold-active catalase from the psychrotolerant fungus *Penicillium griseofulvum*.. *Journal of Basic Microbiology*, 61, 9, 2021, 782-794. SJR (Scopus):0.58, JCR-IF (Web of Science):2.281 **Q3 (Scopus)**
- **Krumova, E., Nikolova, M., Miteva-Staleva, J., Kostadinova, N., Abrashev, R., Dishliyska, V., Berkov, S., Mutafova, B., Angelova, M.** Bio-efficacy of the Essential Oil Isolated from *Origanum vulgare* Subsp. *hirtum* against Fungal Pathogens of Potato. *Comptes rendus de l'Académie bulgare des Sciences*, 74, 10, 2021, 1571-1578. JCR-IF (Web of Science):0.378 **Q3**

Thank you for your attention!

