

BOOK of ABSTRACTS

EXTREMOPHILES: FROM BIOLOGY TO BIOTECHNOLOGY

International Summer course
August 19-25, 2018



National University of
Uzbekistan
EcoBiome R&D Centre
University str. 4
100174, Tashkent,
Uzbekistan
<http://www.ecobiome.uz>



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Nashrga tavsiya etiladi
O'zbekiston Milliy Universiteti
Biologiya Fakulteti

Mikrobiologiya va biotexnologiyaning ilmiy yangiliklari. Xalqaro Yozgi kurs materiallari – T.: “Ilm-Ziyo Zakovat” 2018.-40 bet.

Ushbu to'plam biologiya sohasidagi, xususan mikrobiologiya va biotexnologiya sohalaridagi ilmiy yangiliklarni o'z ichiga olgan. Xalqaro Yozgi kursning maqsadi mikrobiologiya va biotexnologiya sohalarida ilmiy tadqiqot ishlari olib boradigan xalqaro taniqli olimlar va yosh izlanuvchi talabalar orasidagi fikrlar almashish, va bilimlarni mustahkamlashdir.

Yozgi kurs «Norvegiyaning Ta'lim sohasida Xalqaro Hamkorlik Markazi (SIU) tomonidan moliyalashtirilgan va O'zbekiston Milliy Universiteti hamda Ecobiome R&D markazi bilan hamkorlikda tashkil etildi.

Abstract Book of International Summer course on “Extremophiles: from biology to biotechnology”, Tashkent, “Ilm-Ziyo Zakovat i”, 2018 – 40 Pages

In the proceedings of the Summer course scientific studies concerning microbiology and biotechnology of extremophiles are included. The goal of the international summer course is to bring together distinguished scientists and young researchers working in the field of diversity, metabolism, genetics and biotechnology of extremophilic microbes. The training course is organized within the framework of the Eurasian project “Network for improving research based higher education in basic and applied microbiology” supported by The Norwegian Center for International Cooperation in Education (SIU) in cooperation with the National University of Uzbekistan and Ecobiome R&D Center.

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ORGANIZING AND SCIENTIFIC COMMITTEE

Prof. Dr. Kakhramon Davranov (National University of Uzbekistan) – Chair
Prof. Dr. Nils-Kåre Birkeland (University of Bergen, Norway)
Dr. Dilfuza Egamberdieva (EcoBiome R&D Ltd., National University of Uzbekistan)
Assoc. Prof. Dr. Hovik Panosyan (Yerevan State University, Armenia)
Dr. Vyacheslav Shurigin (National University of Uzbekistan)

WELCOME NOTE OF THE ORGANIZING COMMITTEE

Dear Participants!

On behalf of the Organizing Committee, we are glad to welcome you to the International Summer course on “Extremophiles: from Biology to Biotechnology”.

The training course is organized within the framework of the Eurasian project “Network for improving research based higher education in basic and applied microbiology” supported by The Norwegian Center for International Cooperation in Education (SIU) in cooperation with the National University of Uzbekistan and Ecobiome R&D Center.

The aim of the workshop is the presentation of scientific and application studies on topics concerning Microbiology and Microbial Biotechnology of Extremophiles. The Program of summer course include the lectures of the most distinguished scientists working in the field of diversity, metabolism, genetics and biotechnology of extremophilic microbes. Welcome to Tashkent and we will do our best to make this meeting and your stay in Tashkent a memorable event. We wish to all of you a nice time, hoping that you will find this a very productive and stimulating scientific event, set up new collaborations and make new friendship.

PRODUCTION OF CAROTENOIDS OF *THERMUS SCOTODUCTUS* K1 AT DIFFERENT GROWTH CONDITIONS AND INVESTIGATION OF THEIR BIOLOGICAL PECULIARITIES

Poghosyan H., Panosyan H., Trchounian A.

Department of Biochemistry, Microbiology and Biotechnology, Faculty of Biology, Yerevan State University, Yerevan, Armenia

Email: heghine.poghosyan2@ysu@mail.am

Carotenoids, which are yellow to red fat-soluble pigments found in plants, algae, fungi and bacteria, widely used in the production of colorants, cosmetics, food, antioxidant and anti-cancer preparations. In contrast to eukaryotes, bacteria produce carotenoids with greater number of carbon atoms, conjugated double bonds and hydroxyl groups, which all contribute to their great antioxidant capacity. Carotenoids are particularly important in adaptation mechanisms to extreme conditions. Thermophilic bacteria from the *Deinococcus-Thermus* phylum actively produce carotenoids involved in mechanisms of protection against heat stress.

The aim of the present study was to investigate the effect of cultivation conditions (temperature, pH, aeration, and lighting) on biomass and general carotenoids productivity of *Thermus scotoductus* K1 isolated from the geothermal spring of Karvachar, Nagorno-Karabakh. The free radical scavenging activity of carotenoid extracts was determined as well. The carotenoids were exhaustively extracted by maceration of dry biomass with methanol for 24 hours on magnetic stirrer, and then concentrated under reduced pressure in a rotary evaporator. Antioxidant property of carotenoid extract was determined by 2,2-diphenyl-1-picrylhydrazyl (DPPH) radicals scavenging using ascorbic acid as positive control. The maximum production of biomass of *T. scotoductus* K1 (0.3 g/L) and specific productivity of carotenoids (1.3 mg/g) was obtained at 65 °C, pH 8, in aerobic conditions. Temperature had a negative effect on biomass production. Slightly alkaline pH (8-9) values had a positive effect on biomass production and yield of carotenoids in both dark and lighting conditions. Although the specific productivity of carotenoids is not dependent on the lighting conditions, the lighting affects the composition of the carotenoids. The main carotenoids of *T. scotoductus* K1 were thermozeaxanthins. In the tested conditions, changes in the levels of the variables influenced the biomass and carotenoid production, although they did not influence the carotenoid profile. Carotenoid extracts from *T. scotoductus* K1 showed good DPPH radical scavenging activity (82%). The results of this study provide a better understanding of cultivation conditions of a thermophile bacterium, *T. scotoductus* K1, on biomass and carotenoid amounts.

Key words: Thermophilic bacteria, *Thermus scotoductus*, cultivation conditions, carotenoids, antioxidant property

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