OFERTA PRACY

Instytut Biochemii i Biofizyki Polskiej Akademii Nauk w Warszawie poszukuje postdoca do realizacji projektu badawczego OPUS pt. „Rola alternatywnych EF-G w regulacji translacji podczas biosyntezy antybiotyków u *Myxococcus xanthus*" finansowanego przez Narodowe Centrum Nauki.

(for English version see below)

Słowa kluczowe: translacja, biosynteza białka, regulacja ekspresji genów, antybiotyki, rybosom, cykl życiowy bakterii, bakteria, metabolity wtórne

Instytucja: Instytut Biochemii i Biofizyki Polskiej Akademii Nauk; Pracownia Translatomiki

Nazwa stanowiska Wykonawcy: post-doc

Dziedzina: biologia molekularna

Sposób wynagradzania: umowa o pracę

Liczba ofert pracy: 1

Kwota wynagrodzenia: 8300 PLN brutto

Okres zatrudnienia: 12-15 miesięcy

Data rozpoczęcia pracy: najszybciej jak to możliwe po terminie ogłoszenia wyników

Imię i nazwisko kierownika projektu: Agata Starosta

Tytuł projektu: Rola alternatywnych EF-G w regulacji translacji podczas biosyntezy antybiotyków u *Myxococcus xanthus*

Opis projektu oraz zadania pracownika:

Protein biosynthesis is a fundamental process in every living cell. Translation is performed by the ribosome and associated factors. Besides the set of conserved and essential translation factors including initiation, elongation and recycling factors, evolution selected for a range of proteins which can help preserve and sustain translational machinery during stress conditions including starvation, stationary phase or antibiotic stress. Regulation of gene expression at the translational level is a phenomenon that allows cells to react immediately in response to changing environmental conditions, compared to transcriptional regulation. Control of protein synthesis therefore allows for a rapid response to a variety of environmental changes, allowing for a fast adaptation of cell growth. Such fast adaptation would manifest not in the transcriptome composition change – which takes relatively long time, but rather in the changed rate at which mRNA is engaged by the ribosome leading to altered translatome – protein levels. Specialized translation factors are known to help protein biosynthesis machinery to respond to aberrations of bacterial growth conditions.

Many factors involved in the response to non-optimal growth conditions are well conserved within the bacterial kingdom. In addition, some bacteria carry genes encoding translation factors responding to antibiotic stress. A group of specialized translation factors – Ribosomal Protection Proteins (RPPs) – is known to aid uninterrupted translation when antibiotics targeting the ribosome are present. The best known examples are TetM/TetO from *Enterococcus faecalis* – an ortholog of elongation factor EF-G – which can dislodge tetracycline off the ribosome or FusB/FusC which bind to EF-G trapped on the ribosome by the antibiotic fusidic acid and promote dissociation of EF-G, thereby enabling translation to continue and conferring resistance to fusidic acid. Such factors belong to the group of antibiotic resistance genes (ARGs).

The interest of my research group are translation factors responding to antibiotic stress. Curiously, my initial analyses of the genome of *Myxococcus xanthus* DK 1622 have revealed triple copy of the gene encoding elongation factor EF-G (varying amino acid sequences). Interestingly, two of these genes are located adjacent to two distinct putative biosynthetic gene clusters encoding thiopeptides. Strikingly, class I of thiopeptide group of antibiotics (thiostrepton) targets translation by binding to the large ribosomal subunit spanning the N-terminal domain of protein L11 to H43/44 leading to disturbance of the GTPase centre. Subsequently, the action of initiation factor IF2, elongation factors EF-G and EF-Tu is inhibited. It is unknown whether paralogs of EF-G identified here function as elongation factors and are indispensable for the general translation or rather act as ribosome protective proteins dislodging thiopeptide bound to the ribosome. In this project, we plan to (I) investigate the role of alternative elongation factors EF-Gs in translation and (II) their possible interplay with thiopeptide antibiotics biosynthesis regulation, inhibitory action and resistance.

We will apply a combination of modern techniques and analyses, including in silico bioinformatical analyses of the genome, genes and proteins and next generation sequencing (NGS) including analyses of transcriptome (RNAseq) and translatome (Ribosome profiling – RIBOseq) to identify genes regulated by the action of the investigated factors. We will also determine when each of the genes encoding EF-G is activated, while using targeted RIBOseq we will identify which mRNAs are translated with the assistance of each of the paralogue. We will take advantage of the unique life style of *M. xanthus*, which may include vegetative growth, sporulation, fruiting body formation or predation, and screen for conditions where antibiotics are produced. These techniques will allow us to identify a detailed timeline for the antibiotic production and regulation. Analyses in vivo will be complemented by in vitro investigations of the role of the paralogs in translation, including their ability to translocate, sensitivity to antibiotics and their ability to protect translation from inhibitory action of antimicrobials. Lastly, we will determine the atomic model of the factors bound to the ribosome using Cryo-EM.

Zadania pracownika

Praca z bakteriami.

Przygotowanie plazmidów do ekspresji, ekspresja białek rekombinowanych, oczyszczanie białek.

Praca z kwasami nukleinowymi (DNA, RNA), izolacja DNA, izolacja RNA, RT-PCR

Sekwencjonowanie wysokoprzepustowe, transkryptomika i translatomika

Oczekiwania formalne wobec kandydatów:

1. Uzyskany stopień doktora w dziedzinie biologia, biotechnologia, biologia molekularna, biochemia (doktorat nie może być starszy niż 7 lat; okresy opieki nad dzieckiem nie wliczają się) najpóźniej w dniu rozpoczęcia pracy.

2. Wiedza z zakresu biologii molekularnej i biochemii.

3. Doświadczenie w pracy z kwasami nukleinowymi, izolacja DNA, RNA, przygotowanie plazmidów do ekspresji białek rekombinowanych. Ekspresja białek i oczyszczanie białek rekombinowanych.

4. Znajomość i doświadczenie techniki sekwencjonowania wysokoprzepustowego, RNAseq będzie atutem.

5. Znajomość języka angielskiego, doświadczenie w przygotowaniu publikacji naukowych.

Lista wymaganych dokumentów

1. Dokument potwierdzający uzyskanie stopnia doktora (doktorat nie może być starszy niż 7 lat), najpóźniej w dniu rozpoczęcia pracy.

2. CV

3. list motywacyjny

4. kontakt lub list polecający od poprzedniego pracodawcy lub promotora

Wybór Wykonawcy odbędzie się w dwóch etapach:

1. Pierwszy etap - Komisja Kwalifikacyjna (Kierownik Projektu oraz przynajmniej 2 samodzielnych pracowników naukowych z IBB PAN) dokona oceny dokumentów. Na podstawie tej oceny wybrane zostaną osoby, które przejdą do drugiego etapu konkursu. Zastrzegamy sobie prawo do kontaktu tylko z wybranymi osobami.

2. Drugi etap - rozmowy kwalifikacyjne kandydatów z Komisją Kwalifikacyjną, w tym krótka prezentacja dotychczasowych osiągnięć naukowych. Na podstawie wyników drugiego etapu zostanie wybrany wykonawca projektu.

Adres przesyłania zapytań formalnych i nieformalnych: agata.starosta@ibb.waw.pl

Aplikacje należy przesyłać za pośrednictwem platformy rekrutacyjnej:

https://system.erecruiter.pl/FormTemplates/RecruitmentForm.aspx?WebID=067846af65fb4a6d8fd74942e528f34d

W przypadku jakichkolwiek trudności prosimy o kontakt: recruitment@ibb.waw.pl

Termin nadsyłania zgłoszeń: 21.03.2025

Prosimy o zamieszczenie następującej klauzuli:

„Wyrażam zgodę na przetwarzanie moich danych osobowych dla potrzeb niezbędnych do realizacji procesu rekrutacji zgodnie z Ustawą z dnia 29 sierpnia 1997 r. o ochronie danych osobowych (Dz. U. z 2016 r. poz. 922 z późń. zm.)”

JOB OFFER

The Institute of Biochemistry and Biophysics of the Polish Academy of Sciences in Warsaw is looking for a post doc to implement the OPUS research project entitled "Translation regulation during antibiotic biosynthesis in soil bacterium *Myxococcus xanthus*" funded by the National Science Center.

Keywords: translation, protein biosynthesis, regulation of gene expression, antibiotics, ribosome, bacterial cell cycle, bacteria, secondary metabolites

Institution: Institute of Biochemistry and Biophysics of the Polish Academy of Sciences; Laboratory of Translatomics

Type of post: post-doc

Domain: molecular biology

Type of contract temporary employment

Number of job offers: 1

Remuneration: ~ PLN 8 300 gross

Employment period: 12-15 months

Date of commencement of work: Directly after recruitment

Name and surname of the project head: Agata Starosta

Project title: Translation regulation during antibiotic biosynthesis in soil bacterium *Myxococcus xanthus*

Project description/candidate tasks

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Scope of tasks:

Work with bacteria.
Plasmid preparation for expression, recombinant protein expression, protein purification
Work with nucleic acids (DNA, RNA), DNA isolation, RNA isolation, RT-PCR
High-throughput transcriptomics and translatomics

Expectations towards candidates:

1. Doctorate in the field of biology, biotechnology, molecular biology, biophysics, biochemistry (Ph.D. degree must not be older than 7 years; periods of childcare do not count) no later than the date of the strat of employment.

2. Knowledge of molecular biology and biochemistry.

3. Experience in working with nucleic acids, isolation of DNA, RNA, preparation of plasmids for expression of recombinant proteins. Protein expression and purification of recombinant proteins.

4. Knowledge and experience of high throughput sequencing techniques, RNAseq will be an asset.

5. Proficiency in English, and experience in preparing scientific publications.

List of documents:

1. Documentation of the doctoral degree (doctorate cannot be older than 7 years) latest at the time of employment.

2. CV

3. cover letter

4. contact or letter of recommendation from the previous employer or doctorate supervisor

The evaluation of candidates consists of:

1. In the first stage the Selection Committee, composed of Project Manager and two independent researchers from IBB PAN) will select eligible candidates. We reserve the right to contact selected candidates.

2. In the second stage the candidates will be interviewed by the Selection Committee. The candidate will be asked to briefly present his or hers CV and outline one main scientific project, which will be then discussed in more detail with the Selection Committee. During the meeting the candidate will be free to inquire about details concerning the project.

Contact for formal and informal inquiries: agata.starosta@ibb.waw.pl

Applications should be sent via recruitment platform:

https://system.erecruiter.pl/FormTemplates/RecruitmentForm.aspx?WebID=067846af65fb4a6d8fd74942e528f34d

In case of any difficulties please contact: recruitment@ibb.waw.pl

Deadline for submitting applications: 21.03.2025

Please include the following consent to process personal data (applications not including this statement will not be processed for legal reasons):

„Wyrażam zgodę na przetwarzanie moich danych osobowych dla potrzeb niezbędnych do realizacji procesu rekrutacji zgodnie z Ustawą z dnia 29 sierpnia 1997 r. o ochronie danych osobowych (Dz. U. z 2016 r. poz. 922 z późń. zm.)”