

# Dr. S. Shivakumar

Faculty Scientist



## Research Focus Key Words

Genomics, Pathogenomics, Horizontal Gene Transfer, Taxonomy, Bacterial Pigments

## Background

Dr. Shivakumara obtained his PhD in Biomedical and Veterinary Sciences from Virginia Tech, USA, in 2007.

After two (2007-2011) postdoctoral stints (one at the University of Kansas, and the other at the Los Alamos National Laboratory) he joined IBAB as a Faculty Scientist in February 2012. In addition to genomics research, he is involved in teaching microbiology, cell biology, and lab courses related to these modules to MSc students at IBAB.

Dr. Shivakumara is also the coordinator of the MSc program (since April 2015).

## Education

PhD: Virginia Tech, USA, 2007

Postdoctoral Research:

1. University of Kansas, Lawrence, Kansas, USA
2. Los Alamos National Laboratory, Los Alamos, New Mexico, USA

## Professional Experience

Instructor and Lecturer, University of Agricultural Sciences, Bengaluru, 1999-2001

## Research Interest Profile

Welcome to SK's lab page!

We are interested in the genetics and genomics of prokaryotes.

We are particularly interested in elucidating the mechanisms and roles of gene gain and loss in bacteria of pathogenic and biotechnological importance.

Our current research emphasis is on the application of comparative genomics for understanding horizontal gene transfer and the evolution of bacteria of diverse genera.

Another area of research is genome-based taxonomy of bacteria.

## Research

1. **Characterization of C<sub>40</sub> carotenoid biosynthesis in *Sphingomonas* spp.**  
Carotenoids possess potent antioxidant and free radical scavenging properties, and are produced by several species of bacteria, including members of the genus *Sphingomonas*. *Sphingomonas*. [*Pseudomonas*]

## Address

Institute of Bioinformatics and Applied  
Biotech Park, Electronic City Phase I,  
Bengaluru 560100,  
India

## Phone

080 2852-8900. extension 108

## Email

shivakumar@ibab.ac.in

*Sphingomonas echinoides* was isolated and characterized by Dr. Wolfram Heumann, and is believed to produce nostoxanthin, which is a xanthophyll that imparts yellow colour. The NRRL culture collection contains two strains of *Sphingomonas echinoides*, one of which (B-3126) forms yellow colonies, while the other (B-3127) forms off-white colonies. We are working on further characterization of these two strains, including the pathways of carotenoid biosynthesis in them as well as other strains of *Sphingomonas* spp.

2. **Characterization of C<sub>50</sub> carotenoid biosynthesis in *Kocuria* spp.**

*Kocuria rosea* is the type species of the genus *Kocuria*, which is named after the Slovakian microbiologist Dr. Miroslav Kocur. Members of this genus are Gram positive, coccoid, NON-MOTILE, and non-encapsulated. Members of *Kocuria rosea* are known to occur in pairs, tetrads, or clusters. Colonies are pink or red. Our laboratory has isolated a strain of *Kocuria* spp. that is motile and produces C<sub>50</sub> carotenoids and a water-soluble pigment. We are working on further characterization of this strain, using genomic and proteomic approaches.

3. **Characterization of flexirubin biosynthesis in *Chryseobacterium* spp.**

The genus *Chryseobacterium* was formally established in 1994 and contains more than 100 species with validly published names. Most of these species are yellow or orange coloured, and contain a flexirubin type pigment. Our laboratory has isolated a strain of *Chryseobacterium* spp. that appears to represent a novel species within the genus. In addition to the investigation of flexirubin biosynthesis pathways in bacteria, we are working on the taxonomic characterization of novel species of *Chryseobacterium*.

**Lab members:**

1. Vandana Viswanathan – PhD student
2. Enid Mendonca – Intern (MSc student at VITU, Vellore, TN)

**Collaborators:**

1. Dr. Sathish B. Shivachandra, Principal Scientist, ICAR-National Institute of Veterinary Epidemiology and Disease Informatics, Bengaluru, India
2. Dr. B. E. Pradeep, Sri Sathya Sai Institute of Higher Learning, Prasanthi Nilayam, AP, India

**Publications and patents:**

**2018**

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2. **Siddaramappa S**, Viswanathan V, Thiyagarajan S, Narjala A. Genomewide characterisation of the genetic diversity of carotenogenesis in bacteria of the order Sphingomonadales. *Microb Genom*. 2018 Apr 5. doi: 10.1099/mgen.0.000172.
3. Mahalingam N, Manivannan B, Khamari B, **Siddaramappa S**, Adak S, Bulagonda EP. Detection of Antibiotic Resistance Determinants and Their Transmissibility among Clinically Isolated Carbapenem-Resistant *Escherichia coli* from South India. *Med Princ Pract*. 2018;27(5):428-435. doi: 10.1159/000489885.
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**2017**

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**2016**

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**2014**

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## 2012

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## 2011

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## 2010

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