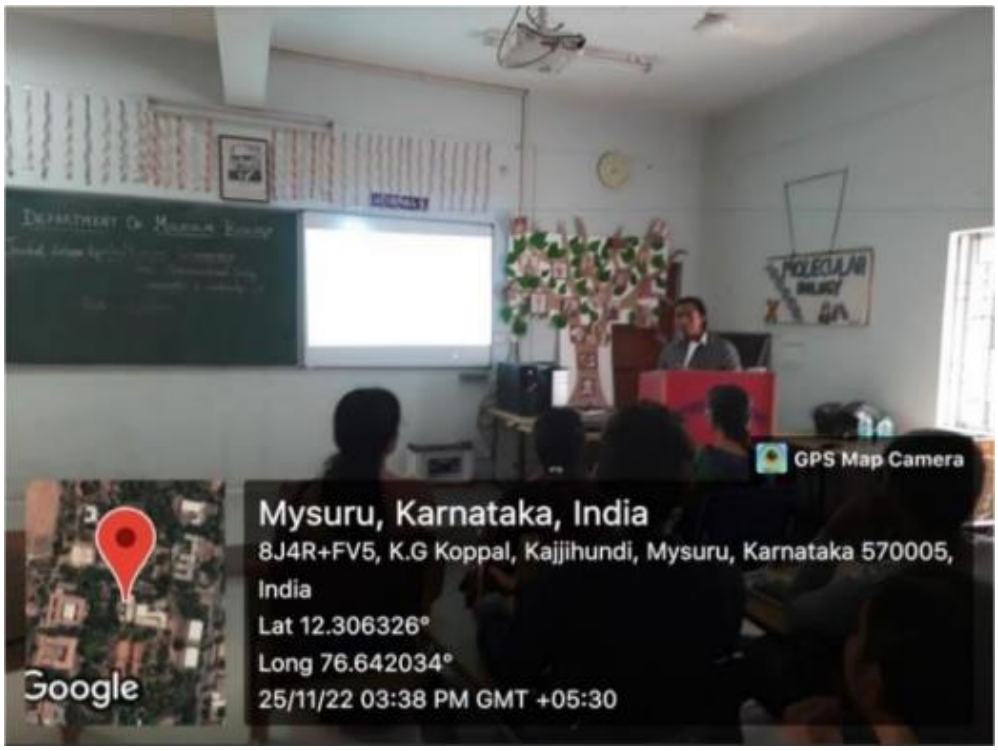
Report on the Invited talk on “Respiratory Super Complexes”

A special lecture by **Dr.Mutum Yaikhomba**, the Medical Research Council Mitochondrial Biology Unit, **University of Cambridge, Cambridge, U.K.,** was arranged on the topic **"The function of respiratory supercomplexes: minimal supercomplexes in Alphaproteobacteria reveal mechanisms for efficient respiration"** on **25.11.2022** from 3.30 PM to 4.30 PM. All students and teachers of the Department were invited to attend the special lecture at Molecular Biology Lecture Hall and was attended **by 92 participants which included both faculty and students**

The programme commenced with a welcome speech and a brief introduction about **Dr. Mutum Yaikhomba** delivered by Sirigowri M.R of 1st semester from the Department of Molecular Biology.

Dr.Mutum Yaikhomba is currently a Structural Biologist working on Mitochondrial Proteins. His seminar began with a brief introduction about the evolution of Mitochondria from its ancestor Alphaproteobacteria. He later went on to present the Cryo-EM structures of the five native modular supercomplexes assemblies $CI_2CIII_2CIV_2$, $CI_1CIII_2CIV_2(cbb_3)$, $CI_1CIII_2CIV_2$, $CI_1CIII_2CIV_1$ and $CIII_2CIV_2$ from Paracoccus Denitrificans, a close relative of the mitochondrial progenitor. He explained how intriguingly, the minimal interfaces between the bacterial complexes are held together predominantly by lipid-mediated interactions, reminiscent of 2D crystals of Bacteriorhodopsin. Despite their minimal interaction interfaces, the resemblance of the bacterial assemblies to their mammalian counterparts is striking shedding light on the evolutionary origins of Eukaryotic supercomplexes. He further explained about how Alphaproteobacterial structures also reveal potential mechanism to enhance catalysis between CI and CIII by providing structural scaffolds to concentrate the Hydrophobic Substrate Ubiguinone-10 between the active sites. Furthermore, a physical tether anchors the membrane tethered cytochrome C_{552} not only at the CIII-CIV interface but also to cytochrome C1, the electron donor site, explaining why the C_{552} functions as an efficient conductor between them. The $CI_1CIII_2CIV_2(cbb_3)_1$, supercomplex structure reveals how this is in stark contrast to the mode of electron conduction between CIII and cbb3 oxidase by the water soluble cytochrome C_{550}. These structures suggest mechanisms for enhancing catalysis in conserved supercomplex architectures that span both ancestral alphaproteobacterial and modern mitochondrial lineages, in addition to other divergent mechanisms utilised by alphaproteobacteria. Towards the last part of the talk he highlighted the unique structural features of alphaproteobacterial complex 1 that have evolved to prevent its transition into a deactivate state, a phenomenon that otherwise underlie a multitude of mitochondrial physiology and disease.

The session ended with a brief note on career guidance options in the vast field of Biology and Life Sciences. This interactive session was enlightening and was attended by all the students from the Department of Molecular Biology.



A view of Dr.MutumYaikhomba explaining the structure of Respiratory supercomplexes

A view of Dr.MutumYaikhomba and Dr. Sudha M N (Ayurvedic doctor who accompanied the guest speaker and attended the Lecture) are interacting in the Course Coordinators Chamber of Department of Molecular Biology after the invited talk.

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