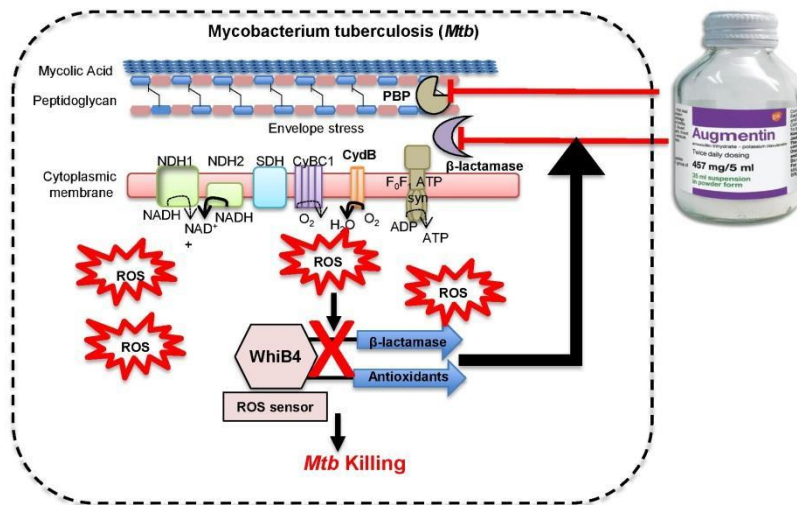


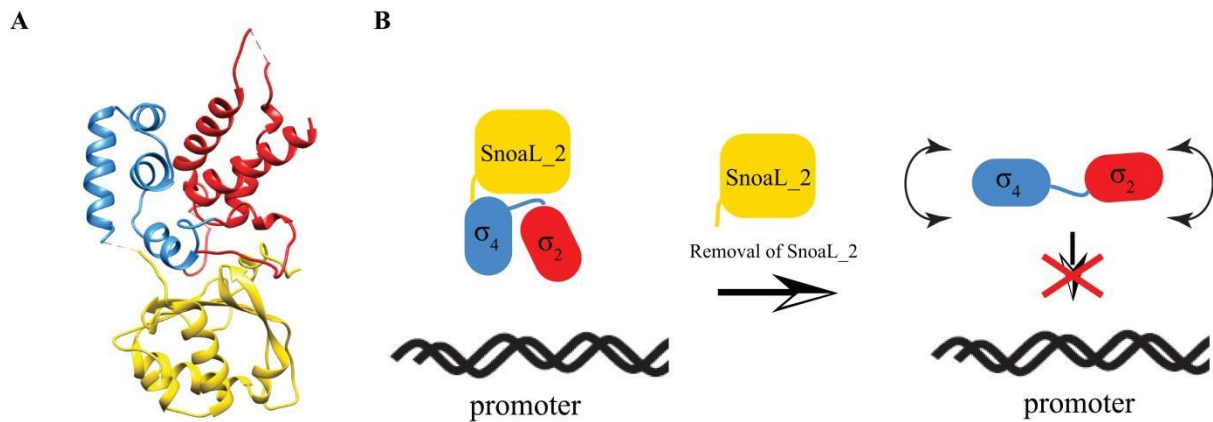
1. Amit Singh (MCB)



Mycobacterium tuberculosis (*Mtb*) is resistant to the most commonly used antibiotic: Beta-lactam (e.g., Augmentin). The bacterium produces Beta-lactamase enzyme that destroys Beta-lactams, and also several antioxidants, which protect *Mtb* from toxic reactive oxygen species (ROS). This study identified a protein WhiB4 in *Mtb*, which inhibits Beta-lactamase and antioxidants production to reverse drug resistance and promote killing by Augmentin.

Reference: S Mishra, P Shukla, A Bhaskar, Anand K, P Baloni, KR Jha, A Mohan, RS Rajmani, V Nagaraja, N Chandra, and **A Singh**. (2017) Efficacy of β -lactam/ β -lactamase Inhibitor Combination is Linked to WhiB4 Mediated Changes in Redox Physiology of *Mycobacterium tuberculosis*. *eLife* 6:e25624 DOI: 10.7554/eLife.25624

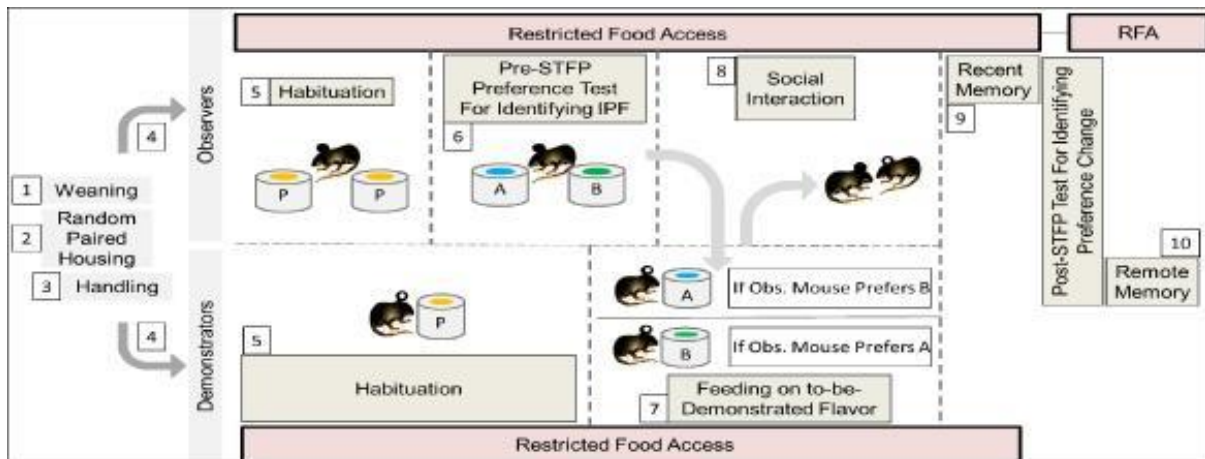
2. B Gopal (MBU)



The crystal structure of *M. tuberculosis* σJ (A) suggests that the SnoaL_2 domain at the C-terminus can modulate the activity of this initiation factor in the absence of a cognate regulatory anti- σ factor. (B) The SnoaL_2 domain modulates σJ activity by regulating promoter DNA binding as well as interactions with the RNA polymerase enzyme.

Reference: K Gautam, AK Gupta, and **B Gopal** (2017) The fused SnoaL_2 domain of the *Mycobacterium tuberculosis* sigma factor σJ modulates promoter recognition. *Nucleic Acids Research*. 54:9760-9772.

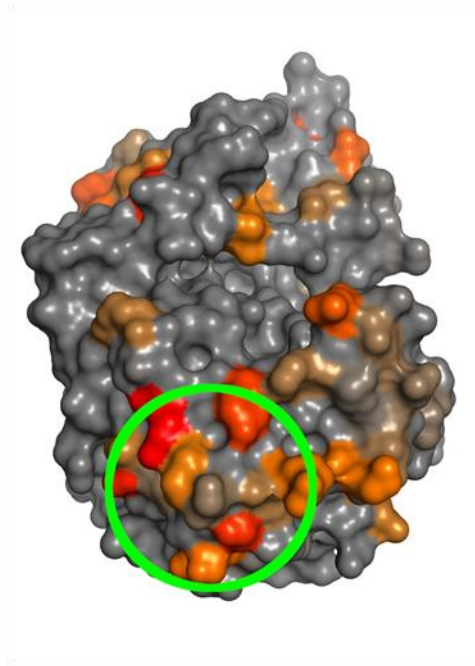
3. Balaji Jayaprakash (CNS)



A novel protocol for conducting social transmission of food preference task in mice. Using this task to study the retrieval dynamics of non-spatial memory, the study showed that the long-term retention of food-preference memory is flavor specific.

Reference: A Singh and **Balaji J** (2017), Sensitive Estimation of Flavor - Preferences in STFP using Cumulative Time Profiles.) *Bio-protocol*. 7(21): e2601 (DOI: 10.21769/BioProtoc.2601)

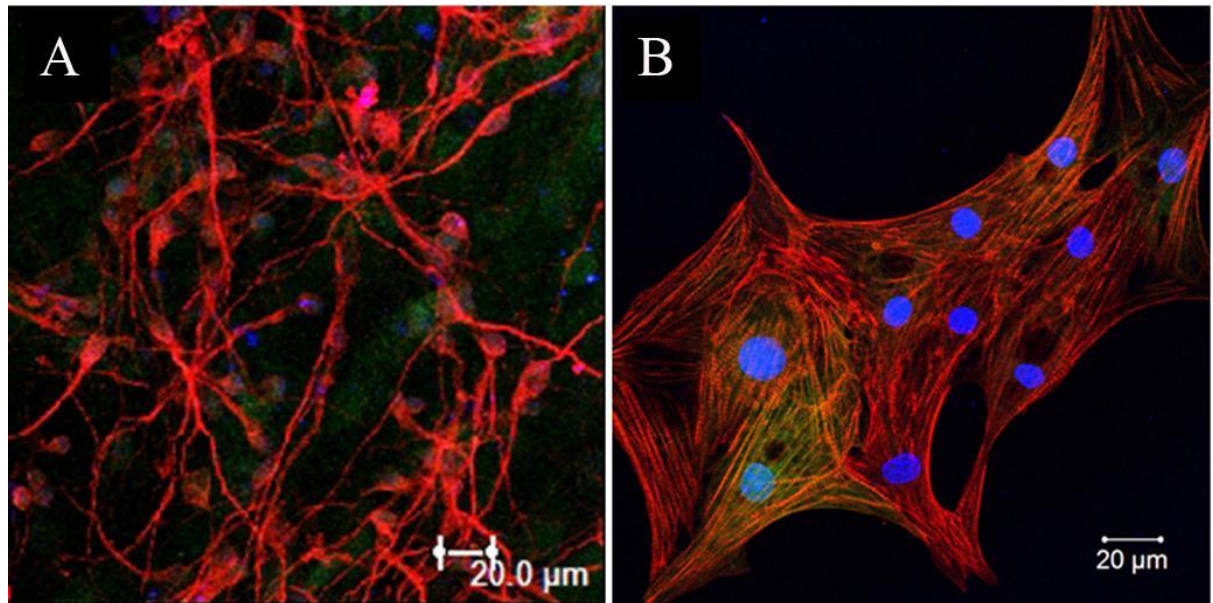
4. N Srinivasan (MBU)



Protein interaction site on the surface of Protein Kinase G predicted using functional specialization site prediction method developed by Srinivasan and his co-workers.

Reference: R Kalaivani, R Reema and **N Srinivasan** (2018) Recognition of sites of functional specialization in all known eukaryotic protein kinase families. *PLoS Comp. Biol.* (accepted for publication).

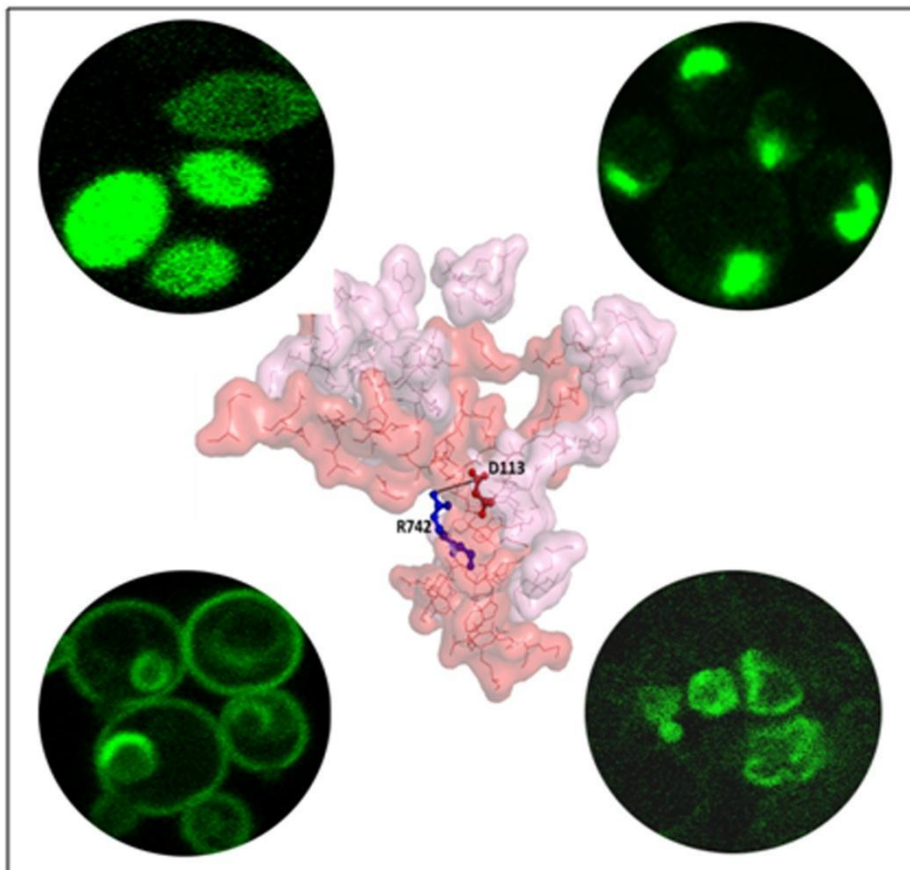
5. P Seshagiri (MRDG)



Heart and Brain Cells derived from Stem Cells. It shows the differentiation of In-house derived embryonic stem cells (GS-2) into mature neurons (A) and cardiomyocytes (B).

Reference: I Verma, Z Rashid, SK Sikdar, **PB Seshagiri** (2017) Efficient neural differentiation of mouse pluripotent stem cells in a serum-free medium and development of a novel strategy for enrichment of neural cells. *Int J Dev Neurosci.* 61: 112-124.

6. PN Rangarajan (BC)



Methionine synthase, normally a cytosolic enzyme involved in methionine biosynthesis, localizes to the nucleus in the yeast, *Pichia pastoris* and performs novel, moon lighting functions. The image shows cytosolic and nuclear localization of methionine synthase in *Saccharomyces cerevisiae* (top left) and *Pichia pastoris* (top right). MS was targeted to

plasma membrane (bottom left) or cytoplasm (bottom right) to understand its cellular functions. Two monomers of MS associate with each other through ionic interaction involving R742 and D113 (centre).

Reference: U Sahu, VKH Rajendra, SS Kapnoor, R Bhagavat, N Chandra, **PN Rangarajan** (2017) Methionine synthase is localized to the nucleus in *Pichia pastoris* and *Candida albicans* and to the cytoplasm in *Saccharomyces cerevisiae*. *J. Biol. Chem.* 292:14730-14746.

7. SP Arun (CNS)



Symmetry has a special status in art, as exemplified by the Belur Somnathpur temple above. But does the brain respond differently to symmetric objects? In a recent publication in *Psychological Science*, researchers have shown that symmetric objects become special in perception because of entirely generic computations in single neurons.

Reference: RT Pramod, & **SP Arun** (2017). Symmetric Objects Become Special in Perception Because of Generic Computations in Neurons. *Psychological Science*. 29(1): 95-109

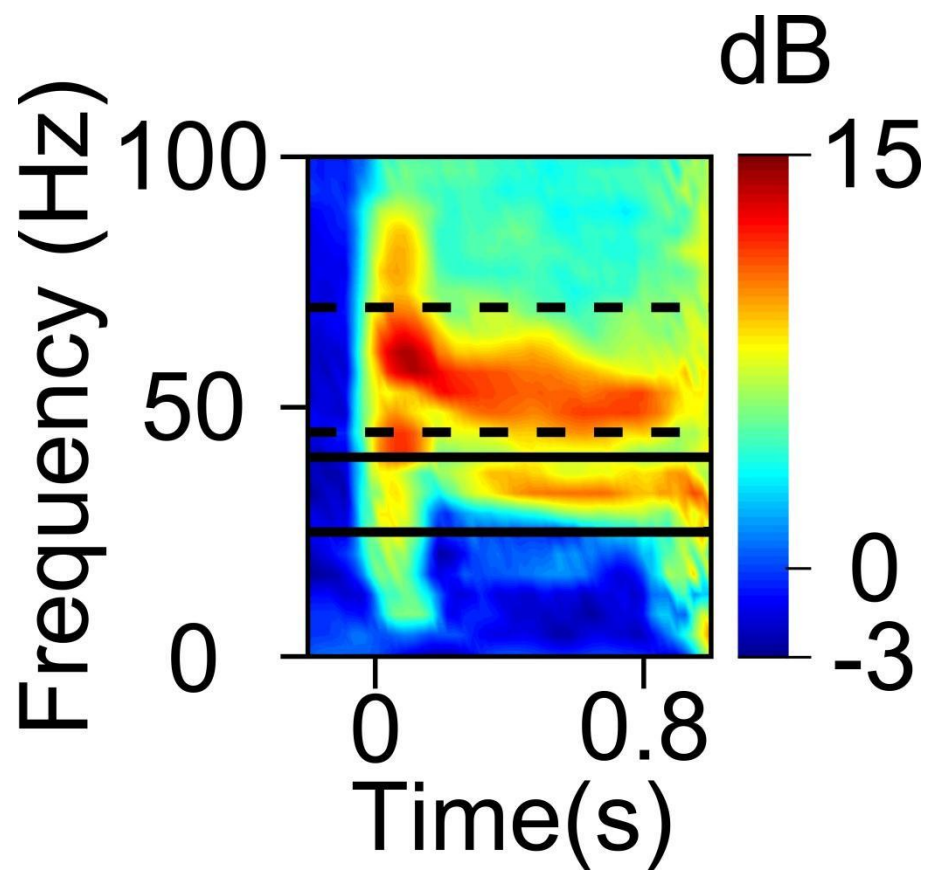
8. Sumanta Bagchi (CES)



Grazing is a dominant land use on earth, and influences the global carbon (C) cycle through its effects on soil. In the Trans-Himalaya, this study found that grazing suppresses soil microbes, and is important for the stability and size of potential C-sink in soil.

Reference: S Bagchi, S Roy, A Maitra, and RS Sran (2017). Herbivores suppress soil microbes to influence carbon sequestration in the grazing ecosystem of the Trans-Himalaya. *Agric. Ecosys. Environ.* 239:199-206

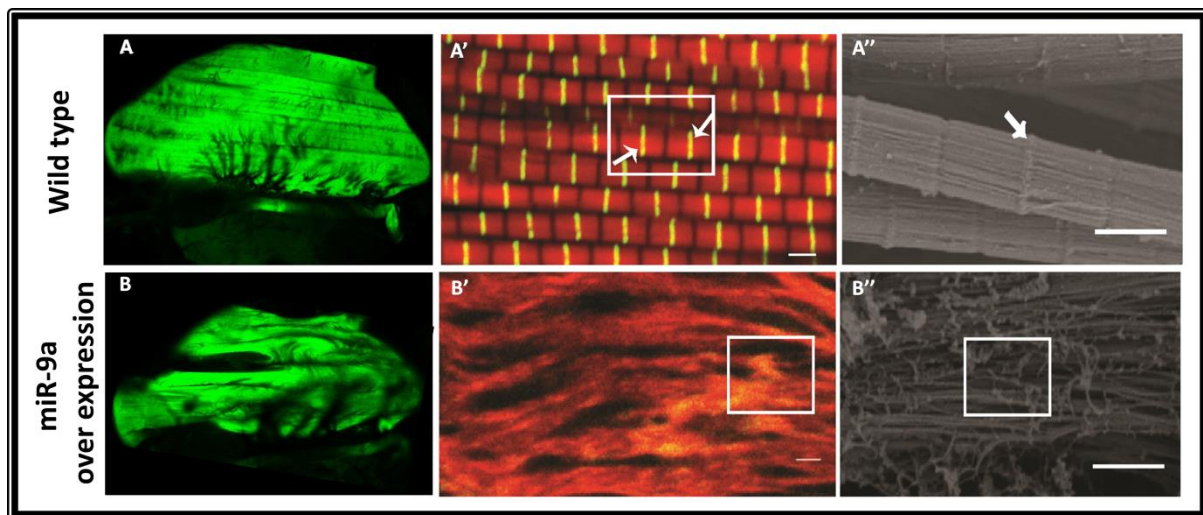
9. Supratim Ray (CNS)



Unlike previous studies that have shown a single gamma rhythm in the primate visual cortex, we found that large visual gratings induce two distinct gamma oscillations in both monkeys and humans that exhibit distinct tuning preferences and potentially reflect processing at two different scales. Figure shows the spectrogram of the brain signal with slow/fast gamma rhythms between solid/dotted lines, respectively.

Reference: MVPS Dinavahi*, V Shirhatti*, P Ravishankar* and **S Ray**. Large visual stimuli induce two distinct gamma oscillations in primate visual cortex. *Journal of Neuroscience*. In Press. (* indicates joint first author).

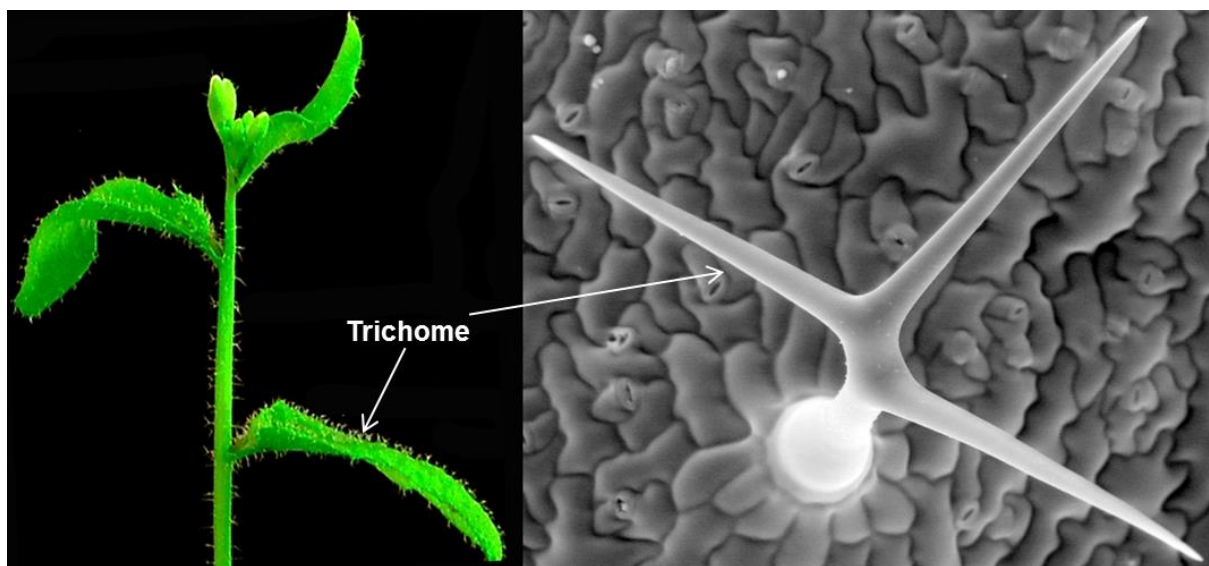
10. Upendra Nongthomba (MRDG)



miR-9 has been implicated in human myocardial hypertrophy. The study demonstrates a new role for miR-9a in *Drosophila* muscle, where it regulates levels of Troponin-T, a structural protein, during sarcomeric assembly. Findings from this study have implication in understanding the cellular pathophysiology of cardiomyopathies. Fig A, A' and A''- normal muscle structure in flies. Fig B, B' and B''- miR-9a over expression causes muscle abnormality.

Reference: P Katti, D Thimmaiya, A Madan and **U Nongthomba** (2017) Over-expression of miRNA-9 generates Muscle Hypercontraction through Translational Repression of the Troponin-T in *Drosophila* Indirect Flight Muscles. *G3: Genes, Genomes, Genetics*. 7(10): 3521-3531.

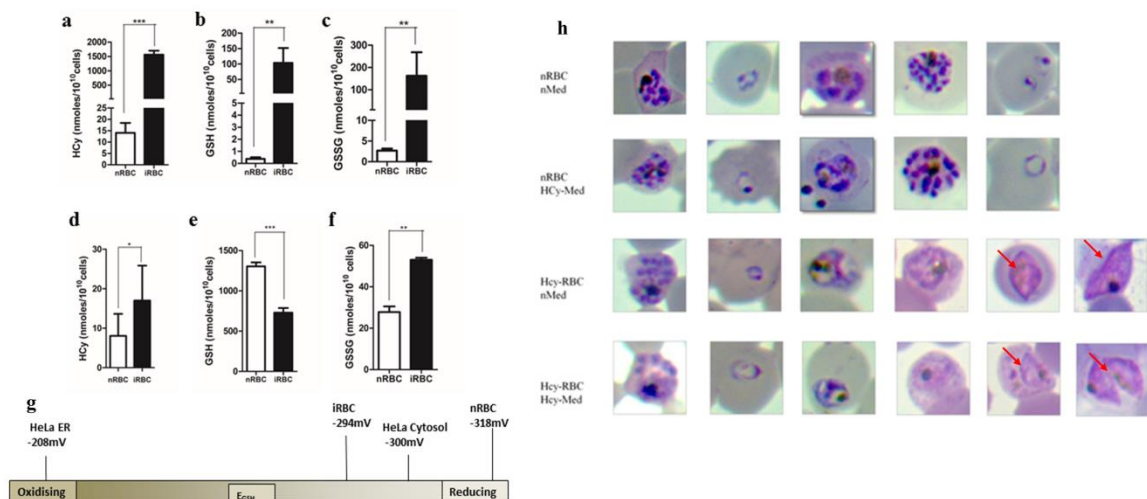
11. Utpal Nath (MCB)



Trichomes are specialized epidermal cells dispersed on plant surface (picture of the left) that can be compared to the hair cells on animal skin. Leaf trichomes in the model plant *Arabidopsis* typically form 3-branched structures (picture on the right), a shape that is genetically regulated. This study has identified the TCP class of transcription factors as a new class proteins that regulate trichome cell shape.

Reference: BVL Vadde, KR Challa, and **U Nath** (2017) The TCP4 transcription factor regulates trichome cell differentiation by directly activating GLABROUS INFLORESCENCE STEMS in *Arabidopsis thaliana*. *The Plant Journal*. 93(2):259-269. doi: 10.1111/tpj.13772

12. Utpal Tatu (BC)



Metabolite quantitation of reduced glutathione (GSH), oxidized glutathione (GSSG) and homocysteine (Hcy) reveal an imbalance in redox potential of *Plasmodium falciparum*-infected RBCs

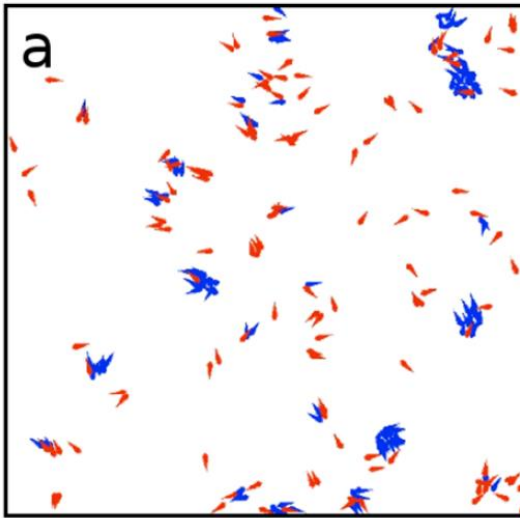
Elevated Hcy levels lead to induction of gametocytes (sexual, transmissible stage) in *Plasmodium falciparum*

Mass-spectrometric based metabolite estimation reveals a role of redox active metabolites in stage transition in the malaria parasite: (a-f) Quantitative measurements of GSH, GSSG and Hcy indicate perturbed levels of these metabolites in Pf-infected RBCs and culture supernatant. (g) Change in the redox scale of RBCs upon Pf-infection. (h) Hcy is the physiological metabolic cue leading to gametocytogenesis in *P. falciparum*.

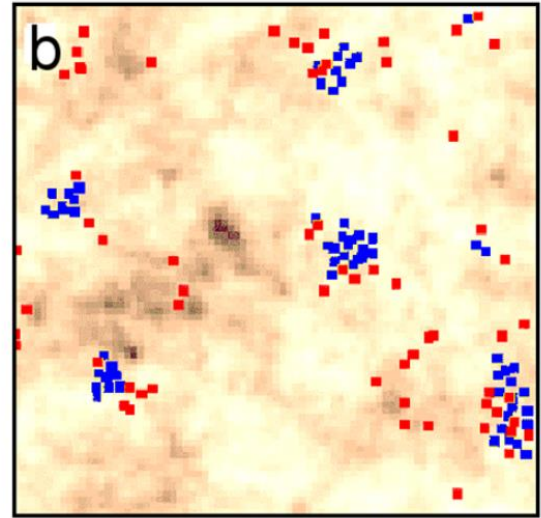
Reference: D Beri, B Balan, S Chaubey, S Subramaniam, B Surendra, and **U Tatu** (2017) A disrupted transsulphuration pathway results in accumulation of redox metabolites and induction of gametocytogenesis in malaria. *Nat. Sci Rep* 7:40213

13. Vishwesh Guttal (CES)

Active system



Passive system



This study challenges this common perception that movement of organisms typically does not favour animals helping or cooperating each other. The image shows how mobility can promote cooperation through self-organised mobile animal groups. Blue individuals represent cooperators whereas red individuals are cheaters. Self-organisation allows cooperators to stay together and avoid cheaters.

Reference: J Joshi, ID Couzin, SA Levin and **V Guttal** (2017) Mobility can promote the evolution of cooperation via emergent self-assortment dynamics. *PLoS Comput Biol* 13(9): e1005732.