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.

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.

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.

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.

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).

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).


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.
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.

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.


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.

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.

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.

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.