Statement regarding new facts:

This thesis presents UV-Visible, stopped-flow, steady-state fluorescence quenching studies of bovine lactoperoxidase and related compounds. Observed characteristics of intrinsic fluorescence of bLPO allowed us to assign emission signal entirely to the tryptophan residues. The fluorescence maximum observed at 338 nm revealed that the 15 tryptophans in the bLPO molecule, are equally distributed in both hydrophobic and hydrophilic environments. The fluorescence is quenched by the energy transfer from tryptophans to heme chromophore. The “average” distance between heme and the tryptophan within the enzyme is 25.1 ± 0.2 Å. The total relative quantum yield averaged over the twelve tryptophans, (0.11) agrees well with the measured quantity in the present work (0.0925). Effects of GdnHCl on fluorescence was to expose the tryptophans to aqueous solvent. Due to presence of twelve disulphide residues in bLPO, fluorescence and back-bone circular dichroism spectra of dithiothreitol treated bLPO in presence of GdnHCl and urea showed that bLPO is as conformationally stable as plant peroxidase HRP-C. Well distributed tryptophans along with amide chromophores show equal accessibility and cooperativity in the interaction of the denaturants with bLPO.

By using Marcus treatment of electron transfer reactions, the reorganisation energy, \( \lambda \) was found to be 0.2 ± 0.1 eV, which matches well with the \( \lambda \) values reported for electron transfer proteins in the range of 0.1 - 1.75 eV.

In case of bovine serum albumin, we deduced that the quenching by heme and synthetic heme to BSA is predominantly static, as the association constant found were 23.8 \( \mu \)M and 26.7 \( \mu \)M for heme and synthetic heme respectively.