Leghemoglobin

symbiotic hemoglobin (leghemoglobin) is a hemeprotein found in micromolar concentrations in infected cells of legume roots. This is an essential component for nitrogen fixation by legumes. Leghemoglobin is produced as a result of symbiotic association between bacteroid and plant. The major role of leghemoglobin involves protection of nitrogenase enzyme from denaturation, if exposed to atmospheric concentration of oxygen, but at the same time supply of ample amount of oxygen to bacteria for respiration. Lb consists of a heme moiety and a single polypeptide (globin). Amino acid sequence for globin depends on the legume species, whereas heme moiety remains constant irrespective of the bacterial strain and legume species. Lb occurs within the cell cytoplasm of infected cells and not within the peri-bacteroid membrane, surrounding the bacteria. It is metabolically degraded by different proteases to choleglobin and biliverdin. Lb synthesis starts shortly after nodule initiation and before nitrogenase synthesis. Furthermore, it was found that ancestors to both plants and animals had same hemoglobin gene constitution but it was during the course of evolution that loss of intron and genetic rearrangement of hemoglobin gene of plants and animals occurred. This led to amino acid sequence dissimilarity between animal and plant hemoglobin at about 80% positions. Therefore, it can be concluded that leghemoglobins are very important for the symbiotic nitrogen fixation in legumes. And despite of the functional similarity between the animal and plant hemoglobins, there occurs a wide range of difference in their amino acid sequence.