When incubated anaerobically, in the light, in the presence of C$_2$H$_2$ and high concentrations of H$_2$, both Mo-grown *Anabaena variabilis* and either Mo- or V-grown *Anabaena azotica* produce large amounts of H$_2$ in addition to the H$_2$ initially added. In contrast, C$_2$H$_2$-reduction is diminished under these conditions. The additional H$_2$-production mainly originates from nitrogenase with the V-enzyme being more effective than the Mo-protein. This enhanced H$_2$-production in the presence of added H$_2$ and C$_2$H$_2$ should be of interest in approaches to commercially exploit solar energy conversion by cyanobacterial photosynthesis for the generation of molecular hydrogen as a clean energy source.

**Key words:** Hydrogenases, Alternative Nitrogenases, Photobiological Hydrogen Production in Cyanobacteria