P–E2–09

Stark spectroscopy on Light Harvesting complex 1 and B820

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Purpose: The B820 subunit of the core antenna of purple bacteria is a protein bound Bchl-a dimer. In this study we investigate the excited state properties of this dimer. In particular we compare B820 to the special pair P of the bacterial reaction center (RC) where electric field measurements have indicated a strong mixing between the lowest exciton state and a charge transfer (CT) state.

Methods: We have measured 77K Stark spectra of B820 of *Rsp. rubrum* and its LH1 complex. The Stark spectrum gives information on the electric properties of molecules, difference polarizability, $\Delta\alpha$, and $\Delta\mu$.

Results: The Stark spectrum of B820 is dominated by $\Delta\mu$, however the value is small which is an indication that little CT character is admixed to the lowest energy exciton state of this dimer. The Stark spectrum of LH1 is very large and dominated by $\Delta\alpha$. $\Delta\alpha$ of LH1 is even larger than $\Delta\alpha$ of P.

Conclusions: In both the LH1 and B820 particles CT-states are only moderately involved in determining the spectral properties. The large polarizability of LH1 may be an indication that electrons are to some extent de-localized over the ring.

P–E2–10

LOSS OF PERIPHERAL POLYPEPTIDES IN THE STROMAL SIDE OF PSI IN LIGHT-CHILLED CUCUMBER LEAVES

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Purpose: The PSI activity is known to be inhibited by light-chilling. Its iron-sulfur centers are presumed to be the primary target by some authors, but there is no evidence of PSI damage at protein level.

Methods: Leaf discs of pea and cucumber were light- or dark-chilled at 4°C. Isolated thylakoids were separated on a native green gel in the first dimension and on a fully denaturing SDS-PAGE gel in the second dimension.

Results: The intensity of a band on the native green gel was increased only in thylakoid membranes isolated from light-chilled cucumber leaf discs. The 77K fluorescence spectrum of this band indicated that this band was mainly composed of PSI. The polypeptide composition of this band showed that PsaM(16.5 kDa) and two peripheral polypeptides exposed to stromal side of PSI, PsaD(19 kDa) and PsaE(18 kDa), were missing.

Conclusions: Our results showed an evidence of light-chilling induced damage in the acceptor side of PSI at protein level in a chilling-sensitive cucumber. However, whether the light-chilling causes this loss of polypeptides directly or via the inactivation of iron-sulfur center is still unknown.

P–E2–11

EFFECTS OF HIGH TEMPERATURE ON PHOTOSYNTHETIC MEMBRANES

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Purpose: It is known that photosynthetic membranes in higher plants are most sensitive to high temperature treatments. However, it has not been well established that where the site(s) of damage located.

Methods: Fluorescence temperature curves (FTC) defined as a temperature dependence of chlorophyll fluorescence intensity during linear heating (3°C/min) of leaves and chloroplasts and delayed luminescence (DL) kinetics are registered.

Results: Two characteristic peaks of higher fluorescence intensity are observed within FTC. The first peak located at 55°C and as shown on DL measurements accompanied by the loss of PS II activity. These changes are partly reversible under transfer the leaves and chloroplasts to low temperatures. The second peak situated above 62°C and has irreversible character.

Conclusions: The first peak within FTC is connected with PS II activity and is caused by blocking of PS II electron transport. The origin of the second peak is matter of controversy. The possible mechanisms are under consideration.

P–E2–12

THE EFFECT OF EXCESSIVE LIGHT ON NATIVE PIGMENT FORMS IN HIGHER PLANTS.

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Purpose: Photostability of pigment forms of plants connected with physiological adaptation of leaves to the level of irradiation was investigated.

Methods: A stability of pigment forms of barley and wheat seedlings under excessive light irradiation was studied by the method of derivative absorption spectroscopy.

Results: It was shown that high light treat -ments (500 Wm^{-2} , 1h) at 20°C invariably resulted in sharp bleaching of chlorophyll *a* form band at 682 nm (Chl 682) and bands of β-carotene molecule with maxima at 486, 452nm. Upon transfer of irradiated seedlings to low intensity light (2-3 Wm^{-2} , 1 h) full recovery of above bands to normal level was observed.

Conclusions: We concluded that Chl 682 assosiated with D1 key protein of reaction center of photosystem 2 (PS 2) and β-carotene molecule assosiated with lipid fraction of PS II. Recovery of these pigment forms is connected with *de nove* synthesis of D1 protein and β-carotene molecule at low intensity light.