Identification the two type of proton pumps in plasmamembran of water plants

R.I.Khalilov\*, I.S.Ahmadov\*, A.N.Nasibova\*\*

\*Baku State University,

\*\*Institute of Radiation Problems Azerbaijan National Academy of Sciences, Baku,Azerbaijan

e-mail: ismetahmadov@mail.ru

**Abstract**. The study of functions of the plasma membrane of water plant cells by the measuring of membrane potential was identified that there are two types of proton pumps – redox nature and ATPase proton pumps. We found the redox nature proton pump without the use of an external electronic acceptor. Where other authors have always used an external electron acceptor (eg, ferricyanide) to prove the existence of a redox pump. We observed this when the elodea and vallisneria leaves were irradiated with different wavelengths of UV-vis light. A complex change of membrane potential was detected when leaves of the water plants were exposed to UV. Fast and strong depolarization of the membrane potential occurred during the first minutes of exposure. Regardless of continuing exposure, the membrane potential returned to the starting level, after which a slow phase of depolarization set in. We identified that the action spectrum of fast depolarization of membrane potential at the level of 300 – 330 nm means that, in this case, UV affects the component of a redox chain of the plasma membrane directly. The action spectrum of the slow phase of depolarization at the level 280 – 300 nm means that it affects a protein natural component of plasma membrane, which is H+-ATPase complex. Results of our experiments showed that redox and ATPase proton pumps at the same time, they work in parallel, complementing each other. During irradiation by series of short UV pulses the first impulse inactivates redox-type pump that results in activation of H+-ATPase. The second impulse, acting in the condition inactivating redox pump does not cause intrinsic depolarization, as relative contribution of redox pump in this phase is small after the action of the first impulse. The more remote is the third impulse from first impulse, the more continuous is the condition of reactivation of redox pump, thus ensuring a cyclic process. As a conclusion, initially, the ultraviolet-B (UV-B) radiation inactivates the plasma membrane redox system and then occurs the inactivation of H+ -ATPase.