

**LOW-TEMPERATURE INDUCED TRANSMEMBRANE CHANGES
OCCURRING ON THE PLASMALEMMA AND THE TONOPLAST OF
THE LIVERWORT *Conocephalum conicum***

ELŻBIETA KRÓL, HALINA DZIUBIŃSKA, KAZIMIERZ TRĘBACZ,
TADEUSZ ZAWADZKI, MACIEJ KRUPA and AGNIESZKA BUDA
Department of Biophysics, Institute of Biology, Maria Curie-Skłodowska University,
Akademicka 19, 20 – 033 Lublin, Poland

The liverwort *Conocephalum conicum* generates action potentials (AP) or dose-dependent voltage transient changes (VT) in response to stimuli such as illumination or drops in temperature. VTs (like APs) only appear in excitable cells but (unlike APs) do not propagate and cannot be evoked by electrical stimuli. Besides, they only appear in thalli previously treated with anion channel inhibitors (anthracene-9-carboxylic acid, ethacrynic acid or niflumic acid). Their amplitudes additionally increase in the presence of a potassium channel blocker (TEA – tetraethylammonium). Therefore, it is concluded that the blockage of relatively large anion and potassium currents reveals a much weaker calcium current. Voltage-independent Ca^{2+} -channels must be involved in the ionic mechanism of VT.

In order to investigate the calcium nature of VTs, the external concentration of Ca^{2+} was increased 10- and 100-fold. As per Nerst's law, the VT amplitudes increased by approximately 30 mV. Additionally, calcium-channel inhibitors were used (La^{3+} , Mn^{2+} , Gd^{2+} , nifedipine, verapamil, diltiazem). After 2 – 4 h of incubation in these inhibitors, a decrease in VT amplitude was always recorded. An almost complete inhibition of VTs was observed within several hours of the application of proton pump inhibitors.

Cold-induced VTs were slower (wider) than light-induced VTs. In a few cases a double-phase response was recorded, which could correspond to an intravacuolar measurement. It is postulated that low temperature separates membrane processes occurring on the plasmalemma and the tonoplast.