Combining different ion-selective channelrhodopsins to control water flux by light

Fei Lin[1*], Ruijing Tang[1,2*], Chong Zhang[1], Nicole Scholz[3], Georg Nagel[1] & Shiqiang Gao[1#]

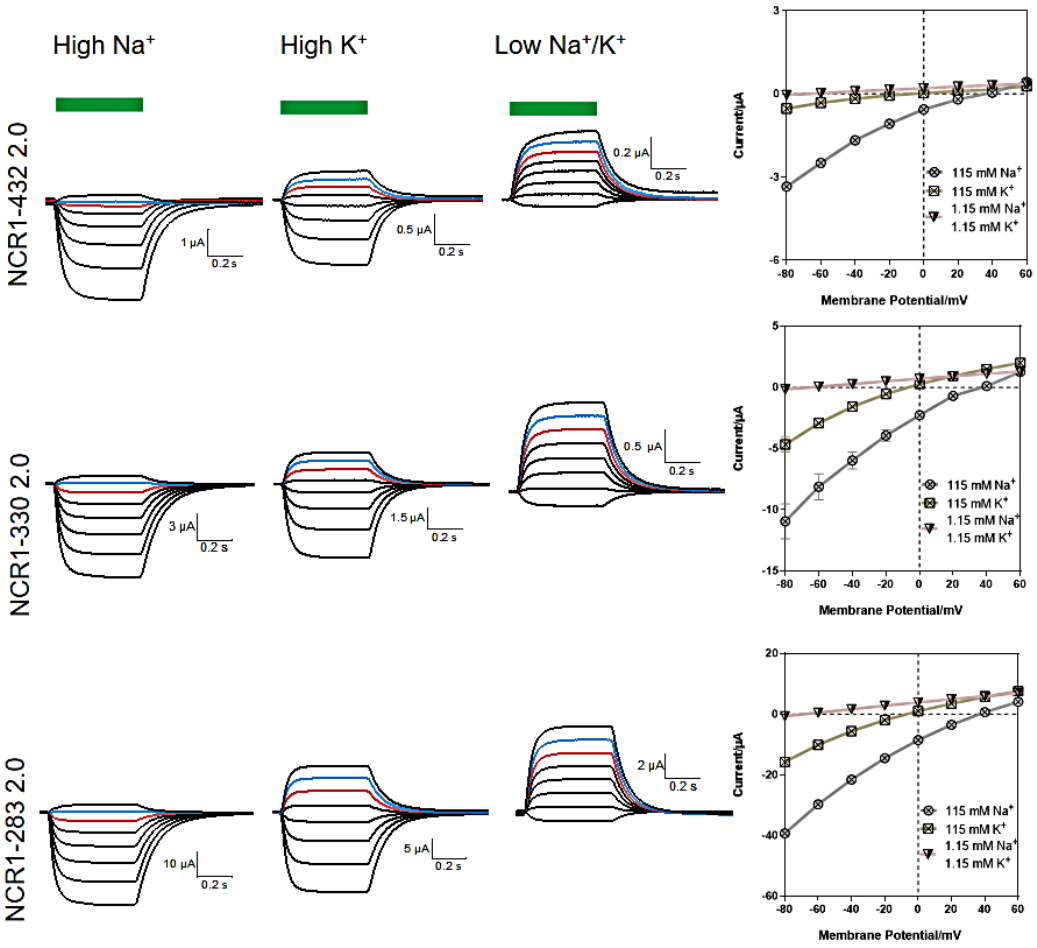
[1] Department of Neurophysiology, Institute of Physiology, Biocenter, Julius-Maximilians-University of Würzburg, Würzburg, Germany

[2] The United Innovation of Mengchao Hepatobiliary Technology Key Laboratory of Fujian Province, Mengchao Hepatobiliary Hospital of Fujian Meidical University, Fuzhou, China

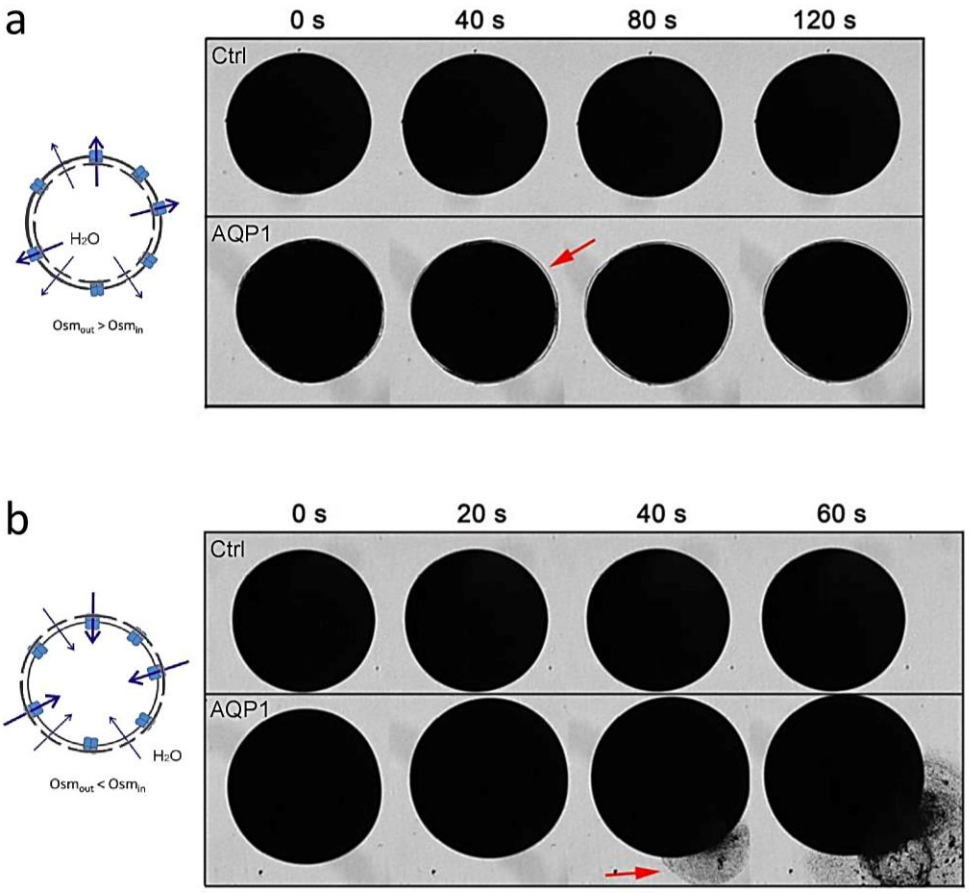
[3] Rudolf Schönheimer Institute of Biochemistry, Division of General Biochemistry, Medical Faculty, Leipzig University, Johannisallee 30, 04103 Leipzig, Germany

[*] Equal contributions.

[#] Correspondence to Shiqiang Gao, gao.shiqiang@uni-wuerzburg.de.



Supplemental Fig S1. Comparing the Na^+ and K^+ conductances of NCR1s. Representative photocurrent traces and current-potential curves of different NCR1 variants in high Na^+, high K^+ and low Na^+/K^+ buffers. For buffer contents, please refer to **Fig 2a**. Photocurrents were measured with oocytes at 2 dpi upon 0.5 s green light (532 nm, 0.5 mW/mm²) illumination, indicated by the green bars. The holding potentials ranged from -80 mV to +60 mV. For the current-potential curves, error bars = SEM, n = 6 experiments.



Supplemental Fig S2. The AQP1-expressing oocyte in hypertonic or hypotonic buffer. The oocytes were injected with 5 ng of AQP1 cRNA and expressed for 2 days in ND96 buffer. The control oocytes (Ctrl) were injected with water. The oocytes were tested at 2 dpi in hypertonic buffer (2x ND96 containing 192 mM NaCl in **a)** or hypotonic buffer (water in **b**). The morphological changes were recorded at different time points using the Leica DMi8 microscope. In **(a)**, the red arrow indicated the separation of the cytoplasmic membrane from the vitelline membrane due to water efflux. In **(b)**, the red arrow indicated the explosive point of the oocytes under the accumulated pressure of water influx.