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A historically significant study that at once disproves the membrane (pump) theory and confirms that nano-protoplasm is the ultimate physical basis of life--yet so simple and low-cost that it could easily be repeated in many high school biology classrooms worldwide

[HHS Vulnerability Disclosure](#)

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Abstract

In 1889 Abderhalden reported his discovery that there is no (or as shown later, little) sodium ion (Na⁺) in human red blood cells even though these cells live in a medium rich in Na⁺. History shows that all major theories of the living cell are built around this basic phenomenon seen in all the living cells that have been carefully examined. One of these theories has been steadily evolving but is yet-to-be widely known. Named the association-induction hypothesis (AIH), it has been presented thus far in four books dated 1962, 1984, 1992 and 2001 respectively. In this theory, the low Na⁺ in living cells originates from (i) an above-normal molecule-to-molecule interaction among the bulk-phase cell water molecules, in consequence of (ii) their (self-propagating) polarization-orientation by the backbone NHCO groups of (fully-extended) cell protein(s), when (iii) the protein(s) involved is under the control of the electron-withdrawing cardinal adsorbent (EWC), ATP. A mature human red blood cell (rbc) has no nucleus, nor other organelle. 64% of the rbc is water; 35% belongs to a single protein, hemoglobin (Hb). This twofold simplicity allows the concoction of an ultra-simple model (USM) of the red blood cell's cytoplasmic protoplasm, which comprises almost entirely of hemoglobin, water, K⁺ and ATP. Only in the USM, the ATP has been replaced by an artificial but theoretically authentic EWC, H⁺ (given as HCl). To test the theory with the aid of the USM, we filled dialysis sacs with a 40% solution of pure (ferri-) hemoglobin followed by incubating the sacs till equilibrium in solutions containing different amounts of HCl (including zero) but a constant (low) concentration of NaCl. We then determined the equilibrium ratio of the Na⁺ concentration inside the sac over that in the solution outside and refer to this ratio as qNaCl. When no H⁺ was added, the qNaCl stayed at unity as predicted by the theory. More important (and also predicted by the theory,) when the right amount of H⁺ had been added, qNaCl fell to the 0.1- 0.3 range found in living red blood (and other) cells. These and other findings presented confirm the AIH's theory of life at the most basic level: in the resting living state, microscopic, or nano-protoplasm, is the ultimate physical basis of life. (See Post Script on page 111.)

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