

NaCl salt enters the 3-D ductal volume of a sweat gland through a 2-D surface, while leaving the 3-D volume as ionized Na and Cl particles through the ductal 4-D surface. At first glance this seems a strange model for a physiologist who is not familiar with 4-D. Nevertheless predicts the model, popularized by Hawking*, that the surplus caloric 4-D (negative) energy of ionized salt can be used as 2-D positive energy to drive 3-D salt transport. This salt transport, realized in a closed loop in the surface of what is called a 4-D 3-Sphere, is analysed in the following way. By substituting NaCl for H ($=6\Delta H$) we first find that the negative 4-D surplus is equal $-4\Delta H$, because $-1/2 \times (8 \times 6\Delta H - 4\Delta H) = -22\Delta H$. And subsequently we find that the positive 2-D surplus energy in the 3-D surface of a 4-D system is also $4\Delta H$, because $3 \times 6\Delta H + 4\Delta H = +22\Delta H$. Hence, the sum of $-22\Delta H$ and $+22\Delta H$ is 0, which indicates that indeed we could live in the 3-D surface of a closed 4-D system. This conjecture is further supported by the 3-D text book Joule/Calorie ratio 4.189, which is given by the product of $1/2 \times 8/3 \times \pi$.

Proving that indeed we live in a closed 4-D system is furthermore elegant and simple. For example the 4-D ionization of NaCl in such system is accompanied by a negative increase in the 3-D hemi-surface, π , from 3 to $22/7$ (because $3 \times 7\Delta H + \Delta H$ is also $+22\Delta H$). $22/7$ is a 4-D ratio. However, this virtual 'swelling' is antagonized by the positive 2-D NaCl association energy, which causes a simultaneous shrinkage of the 4-D hemisphere to $19/7$, simply because $3 \times 7\Delta H - 2/7\Delta H$ is equal to $19/7\Delta H$. Hence everything stays in place (Parmenides). However, we observe that the 4-D values $22/7 (= \pi + 1/800)$ and $19/7 (= e - 0.008 \times 1/2)$ differ slightly from the 3-D mathematical constants π and e , which is due to the identity shift of $1/n$ into n particles during the calculus (intervention). It is the reason why we never get an hold on the Ding an Sich (Kant), although we may speculate that the past gets exchanged for the future in this very small moment, in the empty 3-D 0-space of the 4-D 3-Sphere (Laplace). It suggests that every event is generated as illusion in the basic symbol 0 (Bhaskara I). For us no problem, for the average physiologist it is hard to understand.

Above we presented for the first time in history a rationale for the mathematical constants π and e . The generation of these constants occurs in 4-D, and not in 3-D. Mathematicians are only forced to think that these constants are 3-D bound (mathematical determinism). The mathematical implications are considerable but that is not the point we like to emphasize here. Instead we like to emphasize that dissociation and association are coupled phenomena in a closed 4-D system. Above we showed why and how. 30 years ago we discovered the defect Cl-conductance in CF, while Na-conductance was found to be normal**. Nevertheless the effect of that is that both Na- and Cl transport are reduced in CF. Therefore the general believe is false that Na-transport is larger in CF than in normals. Such believe should be related to anything but scientific insight.

*The grand design. Stephen Hawking and Leonard Mlodinow (2011)

** Quinton PM, Bijman J. N Engl J Med. 1983; 308(20):1185–1189

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