MACROCYCLIC ANION CARRIERS

Hennie Valkenier

Engineering of Molecular NanoSystems, Ecole Polytechnique de Bruxelles,
Université libre de Bruxelles, 1050 Brussels, Belgium

Absence or malfunction of membrane proteins forming anion channels is the cause of several channelopathies, such as cystic fibrosis. Synthetic anion carriers have the potential to take over part of the function of these proteins [1]. Such carriers extract the anion from the aqueous phase, move it across the apolar interior of the lipid bilayer while shielding its charge, to then release it on the other side of the membrane.

Macrocyclic receptors are preorganised in a particular way, often leading to remarkable selectivities in binding and hence unique behaviour in anion transport. A first example are bambus[6]uril macrocycles, which are highly efficient in exchanging Cl^- and HCO_3^- [2], while related biotin[6]urils do not show any transport of HCO_3^- [3]. This can be rationalised based on the different affinities and binding modes that these macrocycles have for the different anions [2,3]. Another example are calix[6]arene tris(thio)ureas, of which the cavity can be exploited to transport organic ion pairs [4].

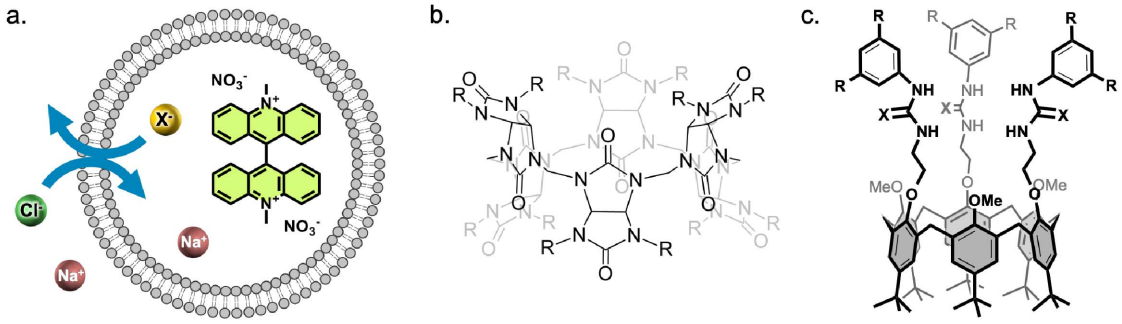

Figure 1. Liposomes with the dye lucigenin encapsulated (a) were used to study anion exchange by bambus[6]urils (b), biotin[6]urils (not shown), and calix[6]arenes (c).

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