SYNTHESIS OF MULTIFUNCTIONAL MACROCYCLIC POLYAMINES FROM NATURAL AMINO ACIDS

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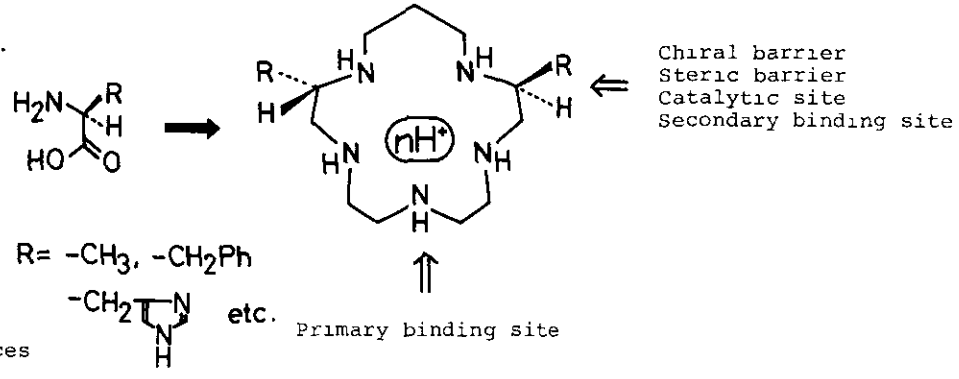
Synthetic receptor molecules serve as very useful tools for chemical elucidation of the mechanisms of molecular association and recognition in many biological processes as well as for developing artificial carriers and catalysts. Recently, we have disclosed that macrocyclic polyamines (as polyammonium salts) are good receptors of biologically important anions such as polycarboxylates,[1] phosphates (ATP^{4-} etc),[2] carbonate,[3] and catecholamines at neutral pH.[4] These simple macromonocycles can form the primary binding sites for biological polyoxyanion carries and catecholamine drug receptors. Further modification and functionalization of the basic macrocyclic skeletons would add more useful biological functions.

Along this line, we have attempted to synthesize a series of chiral macrocyclic polyamines containing side chains and/or functional groups of natural amino acids (see Fig.). Such modified macrocycles may exhibit the following interesting functions toward the binding anionic substrates: (a) chiral recognition (b) catalytic function and (c) "double recognition" by the ammonium site and the side chain functional groups. We will report the results of syntheses and some of their interesting functions.

Fig.



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