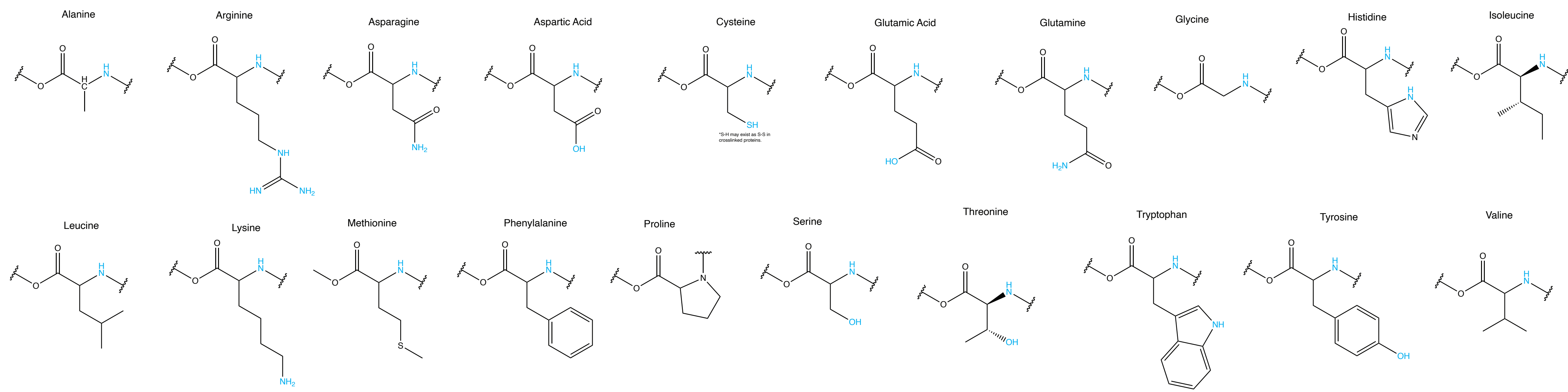


Protein

What are the sources of exchangeable hydrogen in common biomolecules?

Protein comprises 55% of total cell dry weight, with an average molecular weight of 4x10⁴. The amide and side-chain hydrogens exchange in a matter of picoseconds to minutes, depending on how shielded the site is.

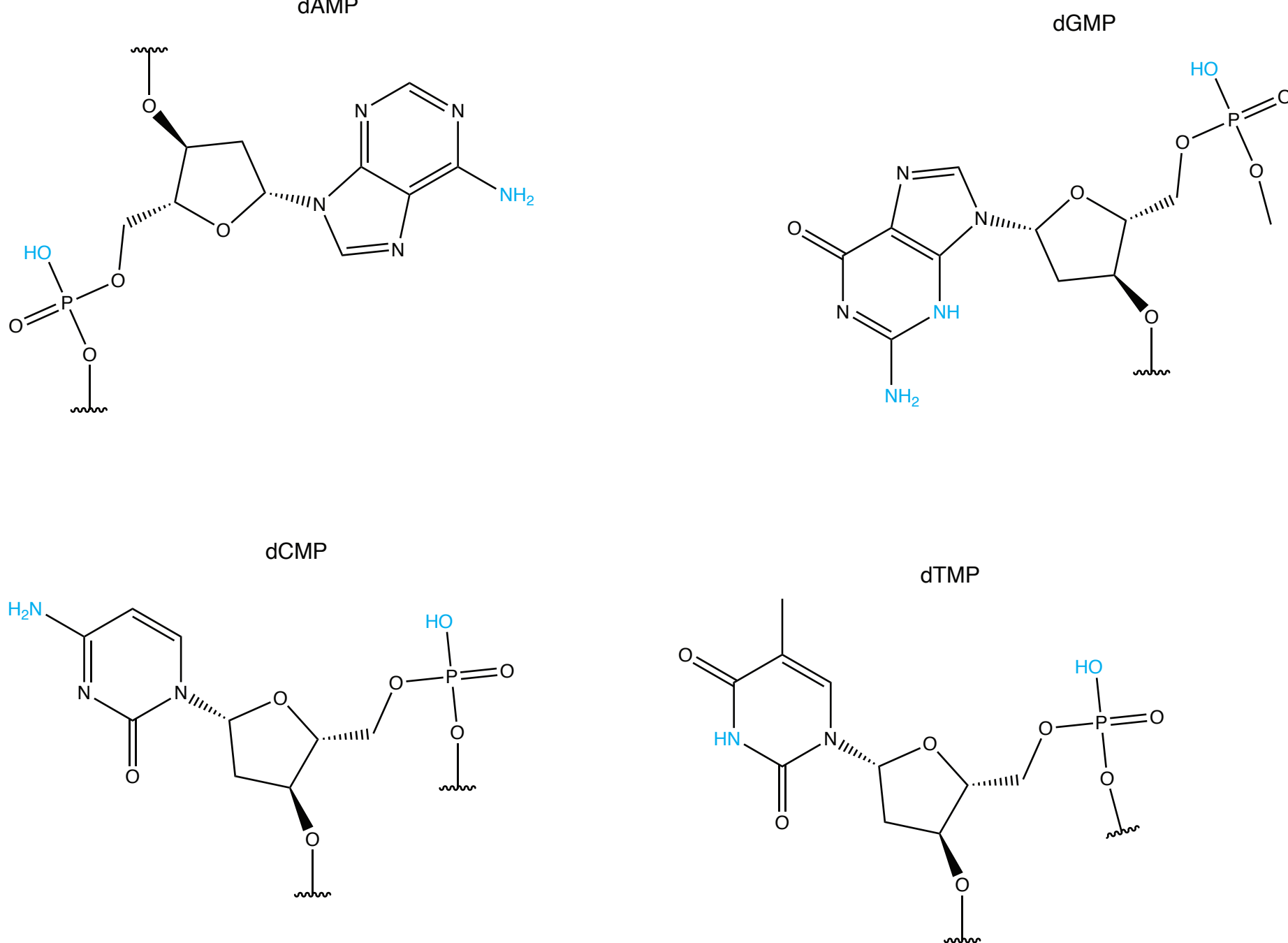
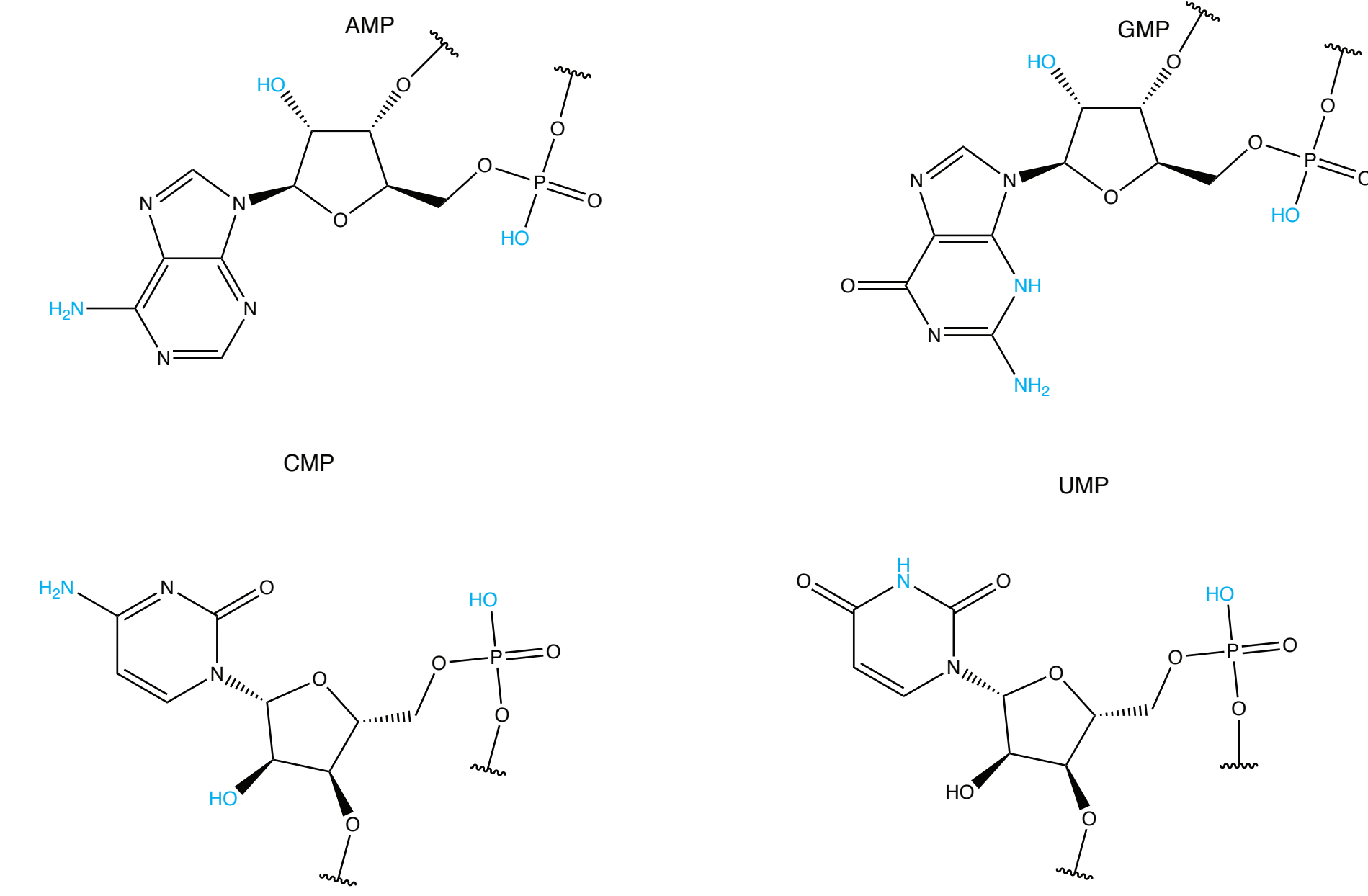


Using the molecular inventory estimates published in Chemical Composition of Eschericia Coli (Neidhardt 1987), we can estimate the fraction of a cell’s hydrogen that exists in readily exchangeable sites. These sites include amine, hydroxyl, carboxyl, sulfide, imine, etc. These groups spontaneously exchange with water in a matter of picoseconds to minutes.

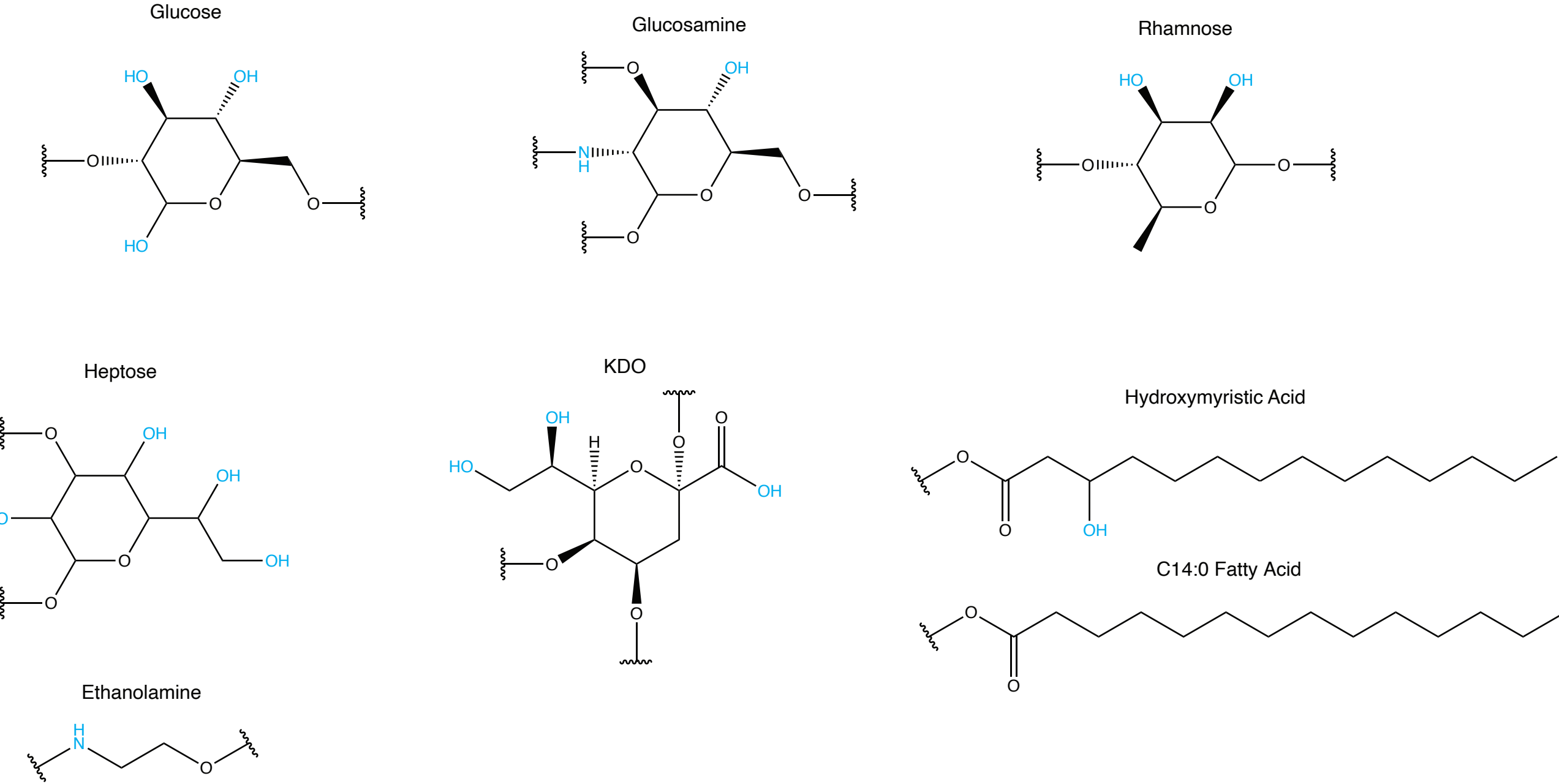
We note that these estimates are rough, and that microorganisms vary widely in their molecular compositions.

RNA

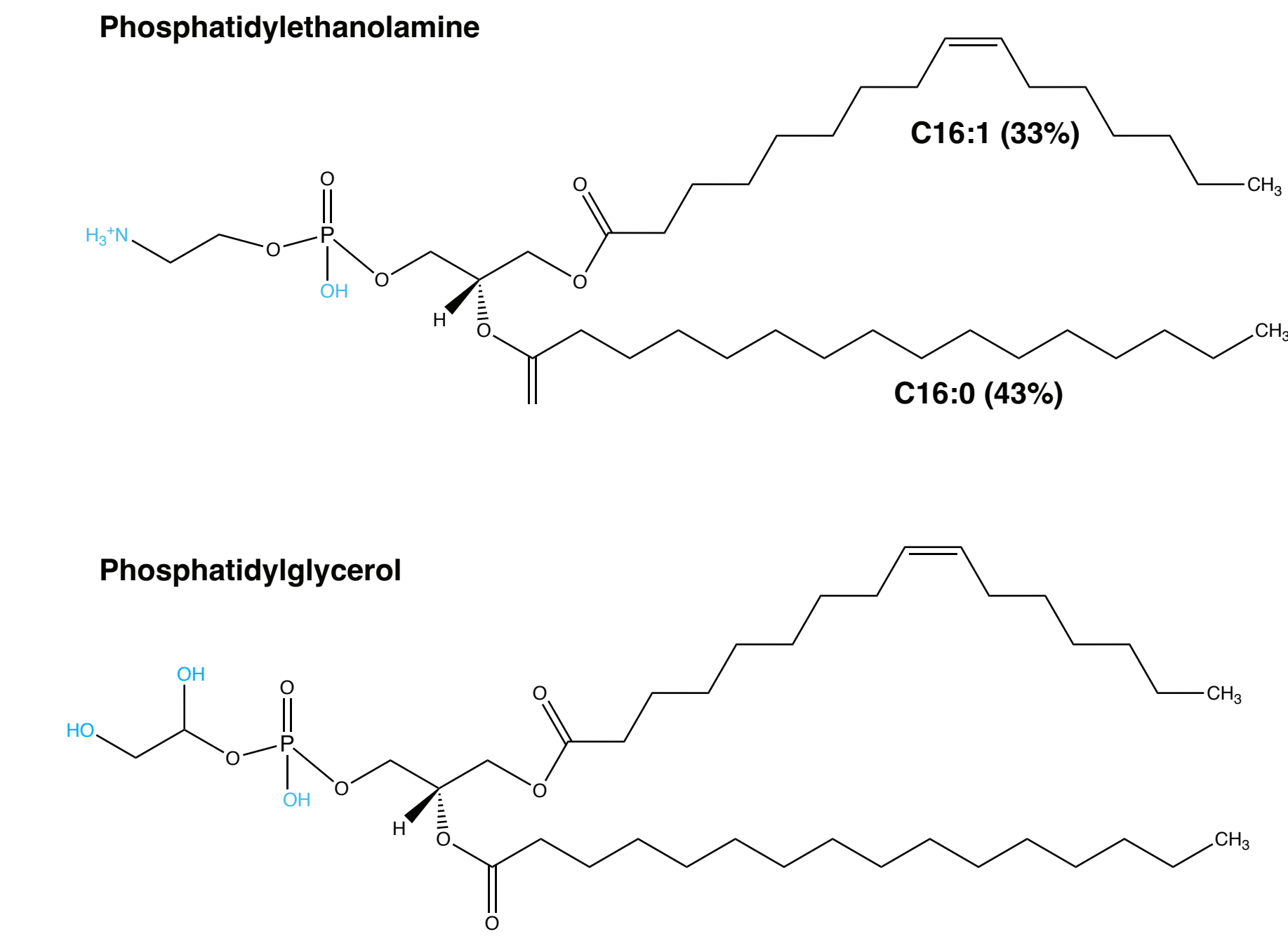
DNA



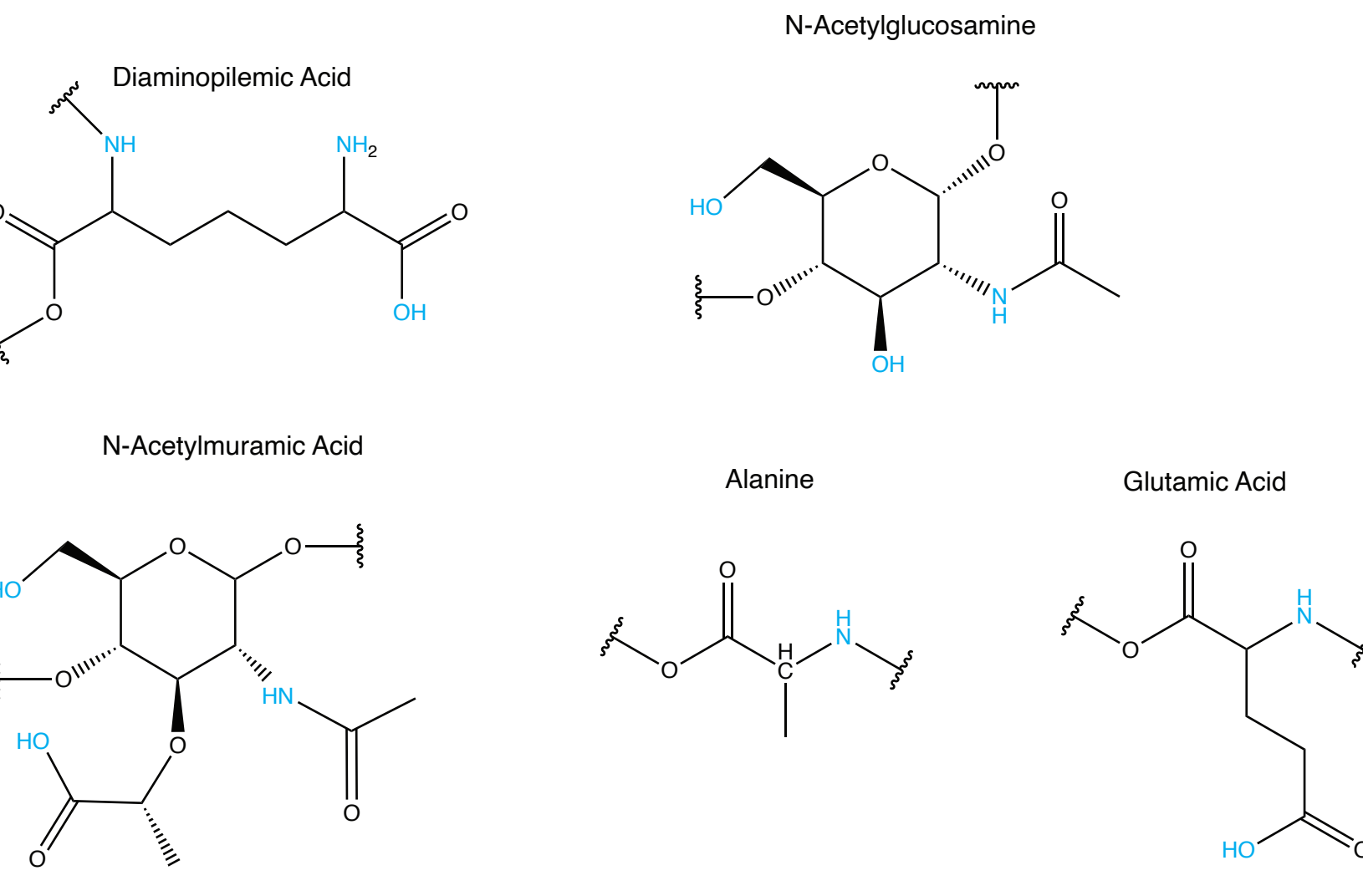
LPS



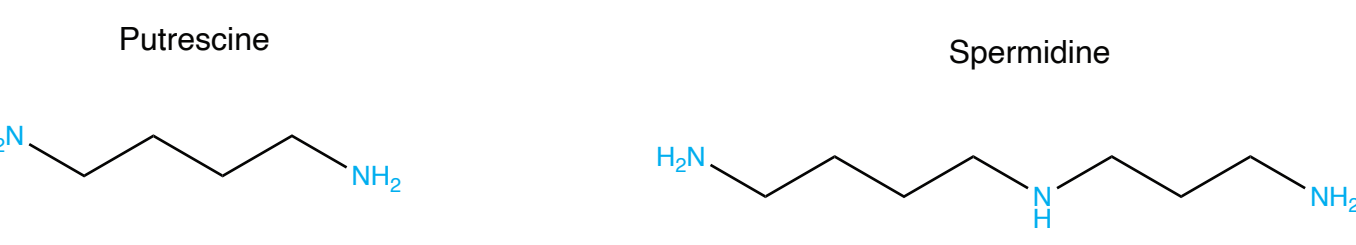
Lipids



Peptidoglycan



Polyamines



Glycogen

