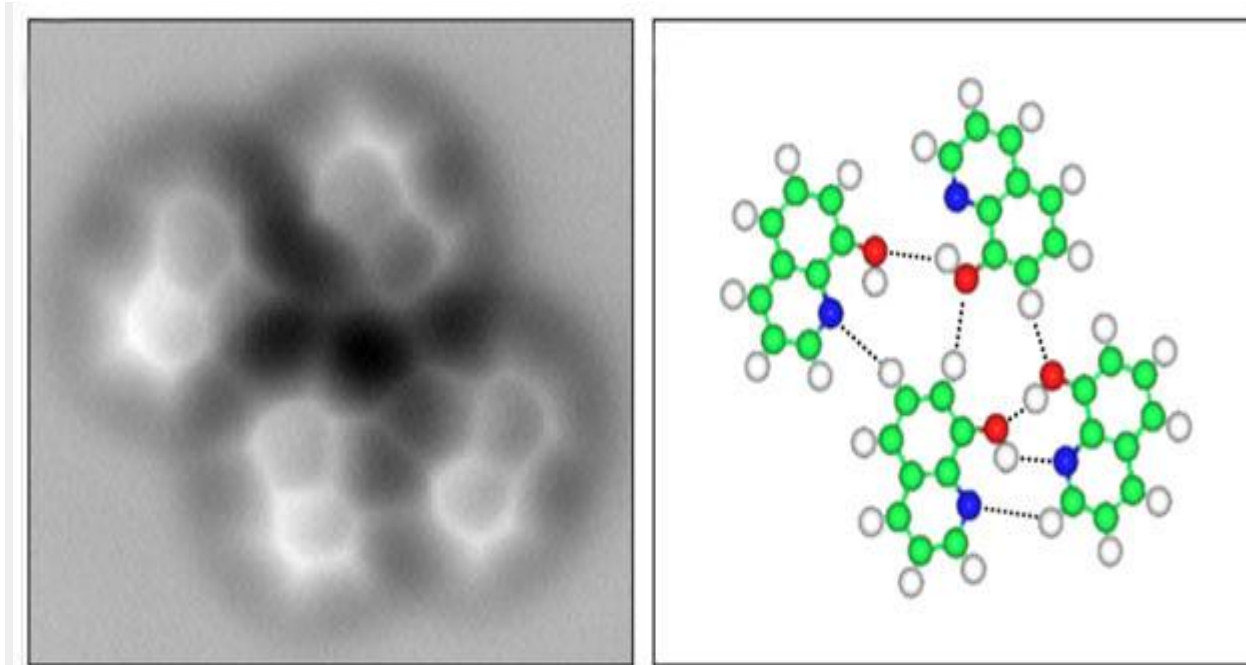


## First Pictures of Hydrogen Bonds Unveiled

Researchers in China report the visualisation of a hydrogen bond using atomic force microscopy (AFM).



Hydrogen bonds linking up quinolines

The remarkable images showed the formation of covalent bonds in a cyclisation reaction. In the latest study to visualise molecules, Xiaohui Qiu and colleagues at the National Centre for Nanoscience and Technology, China, went one step further. They used the same non-contact AFM as Fischer, but instead of looking for covalent bonds they tweaked it to look for weaker interactions.

Hydrogen bonds are fundamental to the most important molecules in nature. They are responsible for holding the two strands of the double helix of DNA together and many enzymes catalyse reactions by making use of them. These intermolecular bonds can form when a hydrogen that is bonded to a highly electronegative atom interacts with another negatively charged atom. Despite their ubiquity, Qiu says that the 'nature of a hydrogen bond is still debated'. It has long been considered an electrostatic interaction, but recently it has been suggested that it has chemical bonding characteristics as evidenced by x-ray diffraction experiments.

The results only confirm that AFM can be used to probe the nature of hydrogen bonds. They do not yet take the debate forward on the nature of the bond. 'The direct observation of hydrogen bonds is consistent with the concept we learned in high school: an electropositive hydrogen atom bridging between two electronegative species X and Y in the designated form of X-H · · · Y,' Qiu says. 'The problem now is to get a deeper understanding of what causes the contrast at the positions of the hydrogen bonds,' Gross says.

Source: <http://revolution-green.com/first-pictures-hydrogen-bonds-unveiled/>