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From protein noodles to the origins of life – why NMR is necessary

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With the sequencing of the human genome in year 2000, a group of proteins that lack the hydrophobicity to drive the formation of their 3D folds emerged. These so-called intrinsically disordered proteins or protein regions – IDPs, constitute 30-40% of our proteome and as much as 70% of our proteins contain disordered regions. More than 20-years of research has uncovered a remarkable diversity in how IDPs interact, ranging from folding upon binding to remaining completely disordered in their complexes. We have asked if and how disordered protein complexes are dependent on specific contacts to make complexes and have used IDPs made of L- and D-amino acids binding to folded L-partners. Using NMR as a key technology, our results show intriguing lack of stereo-sensitivity in the most disordered complexes and point towards the possible existence of a heterochiral world.