Contribution ID: **55** Type: **Flash presentation**

Exploring weak interactions realm with cyclic peptoids

Wednesday, 14 September 2022 16:15 (5 minutes)

A variety of non-covalent interactions, such as hydrophobic effect, hydrogen bonding, Coulombic contacts, and van der Waals interactions, influence the proper protein folding [1]. Many investigations have shown that these conventional forces cannot be the only ones influencing protein folding, implying the involvement of weaker interactions. Thus, a plethora of "non-conventional" forces such as n⊠π* interactions [2], C5 hydrogen bonds [3], and C–H⊠⊠⊠O hydrogen bonds [4] have emerged as co-protagonists to overall protein stabilization. Cyclic peptoids have recently been reported to be a simple and useful tool for the understanding of the aforementioned non-conventional interactions [5]. These N-substituted oligomeric glycines are peptidomimetic compounds that stand out due to their unique properties [6]. Aside from the possible applications, their solid state assembly has been extensively studied in recent years, revealing their ability to organize in a range of supramolecular structures [7].
The crystal structures of four cyclic dodecapeptoids, decorated with a different combination of propargyl and methoxyethyl side-chains, revealed an unprecedented cccctcccct (c = cis, t = trans) amide bond configuration (Figure 1), defining two enantiomorphic right- and left-handed polyproline type I helices bridged by trans residues. It was demonstrated that this conformation is supported by the same type of non-conventional contacts that are essential for protein folding, establishing peptoids as an exceptional framework to explore the impact of weak interactions governing molecular self-organization.

[1] R.W. Newberry, R.T. Raines ACS Chem. Biol. 2019, 14, 1677.
[2] R.W. Newberry, R.T. Raines Acc. Chem. Res. 2017, 50, 1838.
[3] C. Toniolo, E. Benedetti CRC Crit. Rev. Biochem. 1980, 9, 1.
[4] S. Horowitz, R.C. Trievel J. Biol. Chem. 2012, 287, 41576.
[5] G. Pierri, R. Schettini, F.F. Summa, F. De Riccardis, G. Monaco, I. Izzo, C. Tedesco Chem. Commun. 2022, 58, 5253.
[6] F. De Riccardis Eur. J. Org. Chem. 2020, 20, 2981.
[7] (a) C. Tedesco, E. Macedi, A. Meli, G. Pierri, G. Della Sala, C. Drathen, A.N. Fitch, G.B.M. Vaughan, I. Izzo, F. De Riccardis Acta Crystallogr., Sect. B: Struct. Sci., Cryst. Eng. Mater. 2017, 73, 399. (b) G. Pierri, R. Schettini, J. Nuss, R.E. Dinnebier, F. De Riccardis, I. Izzo, C. Tedesco CrystEngComm 2020, 22, 6371.

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Session Classification: MS

Track Classification: Investigating Molecular Crystals: Methods and Applications