A Unique Trimerization in the Solid State

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The MacGillivray group studies reactions of olefins in the organic solid state. Reactions in the solid state can afford products less accessible in solution, while offering a 'green' medium for synthesis. Hydrogen-bond-mediated self-assembly is used to direct [2+2] photodimerizations in solids. During the course of our studies on the reactions of conjugated olefins, we discovered that the diene (E,E)-2,5-dimethylmuconic acid undergoes a rare trimerization in the solid state to afford a bicyclobutyl (Fig. 1). Powder X-ray diffraction was employed to solve the structure of the diene (Fig. 1a) while a co-crystallization was used to structurally-authenticate the stereochemistry of the trimer product (Figs. 1b,c).

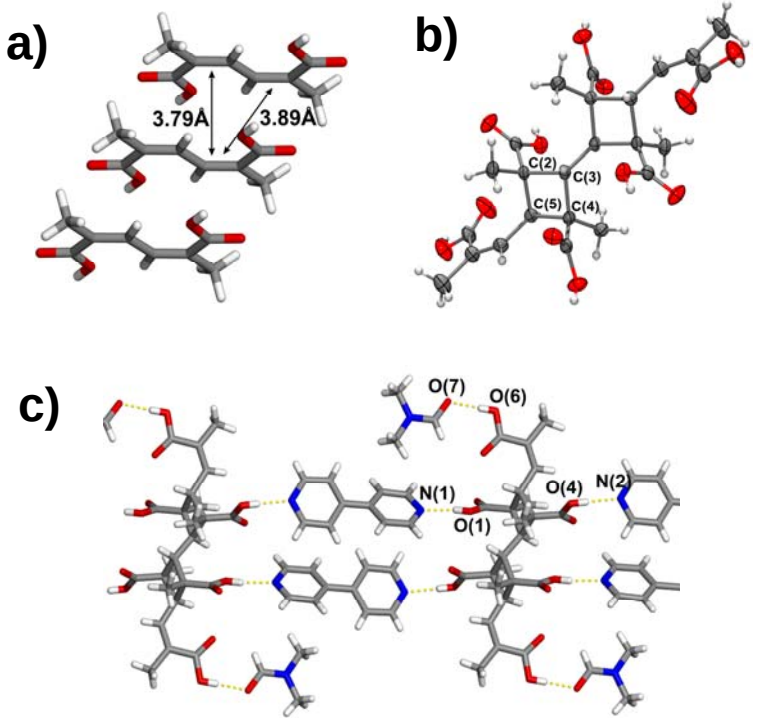

Fig. 1. *X-ray structures involving solid-state trimerization of a diene to give a bicyclobutyl: (a) pure diene, (b) trimer, (c) co-crystal involving 4,4'-dipyridyl.*