A Molecular Pickup

Significance: The idea of using small-molecule machines to manipulate other molecules in analogy to macro biomolecule systems is intriguing. In this report, the authors described a synthetic bi-directional small-molecule transporter system that can move a molecular fragment between two sites through a series of covalent bond formation/cleavage processes.

Comment: The transporter system consists of two benzaldehyde-based cargo platform sites, an alkyl thiol arm, a hydrazone-based rotary switch, and a quinoline-based stator. The acylhydrazine cargo rests on the platform through the formation of the corresponding hydrazone adduct. The ‘pick-up’ and ‘release’ of the cargo is realized through disulfide bond formation/cleavage and dynamic hydrazone formation reactions. The key to the bidirectional relocation of the cargo is the controlled rotation about the center Caryl–N bond toward either side. This is achieved by selective protonation of the quinoline-based stator at different proton equivalents.